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AUGUST 1955

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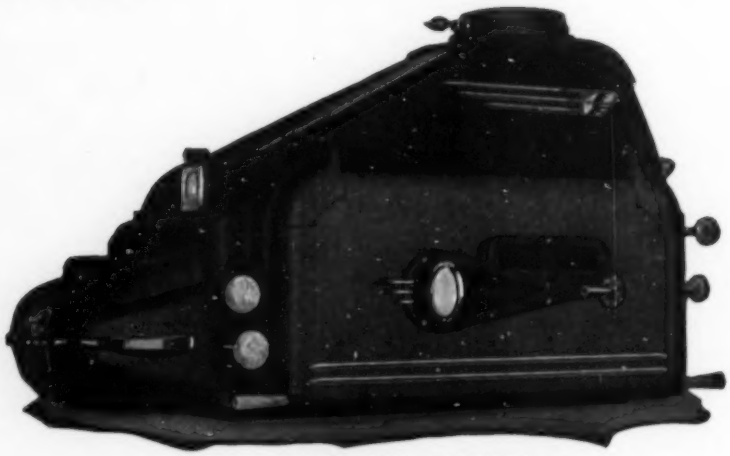

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Monthly Chat

ORDINARILY IP ignores the bleatings of the uninformed, in both the trade and lay press, relative to real or fancied shortcomings in the reproduction of picture and sound in theatres. Very often we are in agreement with such blasts, particularly regarding sound level, a matter solely within the province of the house staff because of the projectionist's total inability to gauge auditorium sound volume by means of his room monitor.

Such criticism of *conditions*, even by the uninformed, can do no great harm; in fact, it might accomplish not a little good in effecting improvement. However, when it comes to assessing the *blame* for such conditions, that is another horse and one that IP won't back.

Just such a critical foray as the latter was indulged in by one Edward Connor in *Variety* for July 13 last (see page 17 of this issue). Now, much that Mr. Connor has to say is factual and wins IP agreement. There is no means readily at hand for assaying Mr. Connor's qualifications on the technological front, but when he charges that the ills he enumerates are chargeable *directly and solely* to projectionists, IP states bluntly that he's talking through his hat. The high standing and wide circulation of *Variety* in the industry serves to compound the injury done to the craft by Mr. Connor.

Even as the IP office was preparing a reply and a rebuke to Mr. Connor, our volatile contributing editor, Robert A. Mitchell, beat us to the punch from afar (also on page 17 herein). Robert A. did himself proud, as usual, in his classic contention that "if it ain't on the print, we can't show it." But this phrase fails by a wide margin to tell the whole story. True, the *image* on the film is a vital factor; but what about the print itself?

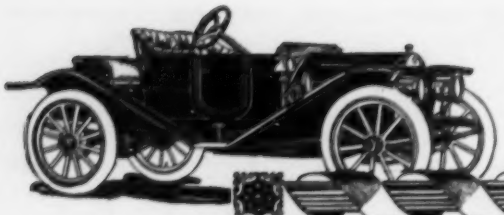
Complexities of Projection Process

Does Mr. Connor have the remotest idea of the scores, literally, of hazards that beset the transit of film through a projector mechanism and which effect vitally the focus of the screen image? Is he aware of the effects upon the projected image of vertical and horizontal drift or improper tension, or "green" or old prints, or beat-up equipment, or the blistering effect of modern carbon arcs pulling a goodly amperage?

We challenge Mr. Connor to attempt under existing projection practice — new film, old film, CinemaScope or other wide-screen process, and even our old friend the 3 x 4 proportion — to maintain proper focus throughout the run of a single feature. We'll gladly escort him to the finest-equipped projection room in the New York area for the test. We'll also bet him $100 that neither he nor any professional projectionist of his acquaintance will turn the trick.

Maybe the tip-off as to Mr. Connor's proclaimed erudition in projection matters is his statement that motion pictures on Tv are superior to the screen image in the theatre. Let it be said here and now that Tv film projection is not only bad — even with new prints made by the networks under careful control — it's hideous.

Anytime you're ready, Mr. Connor.



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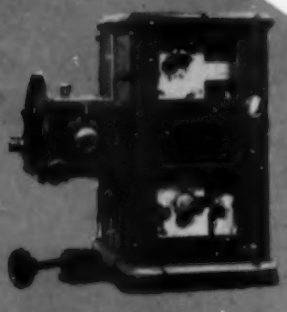
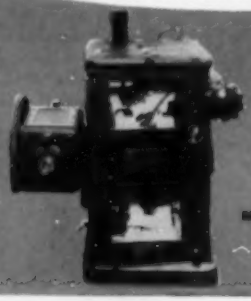


THE MOTIOGRAPH
MODEL K — 1920



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VOLUME XXX AUGUST 1955 NUMBER 8

Projection Room Booby-Traps

By JOSEPH HOLT

IATSE Local 428, Stockton, California

DEVELOPMENTS of recent years have given the projectionist the opportunity to present brighter, wider and more impressive screen images; but with these advances on the technological front have come what the writer refers to as "projection room booby-traps".

Consider the very popular lamps which use circulating water or other suitable coolant around the positive carbon at the point of support nearest the crater. The usual insallation of these lamps provide a connection to the water mains with a manually-operated valve controlling the flow of water.

Jacket Walls Ruptured

Such a condition means that someone must remember to open the valve before the arc is struck. Experiment has shown that in the case of lamps operating below 100 amperes it may be quite possible to operate for short periods of time without water; yet if water be introduced after the cooling jacket is well heated, the walls will be ruptured and the jacket destroyed.

So well agreed are projectionists that the danger exists that it is quite common to see hand-lettered signs calling attention to the necessity of opening the water valve before projection begins.

But is it wise to leave this matter to comparatively haphazard methods when simple control methods are at hand? The writer proposes that more positive means be used, and suggests the following devices, each of which he has personally used and can vouch for their effectiveness.

The wheel of the water valve may be mechanically connected to an electrical switch in such manner that the contacts are open when the water valve is closed. This means that the arc power source may be controlled through its magnetic switch to prevent its starting unless the water valve is open.

Various flow indicators and pressure switches can be used to warn of decreased or interrupted water flow. Any competent projectionist can design his own protection system once the idea has been left with him.

Use of Dual Soundtracks

The use of both optical and magnetic tracks in CinemaScope prints has brought one of the most diabolical booby-traps to the current projection scene. In many rooms it is customary to skip the optical soundhead when threading a magnetic reel, and *vice versa*.

With house leaders being used to provide convenient threading and starting footage, it is asking too much of the projectionist that he keep the track category in mind for each reel in the program. It is therefore once again good practice to look for methods which will provide the double check.

The writer has found that the least errors occur in rooms in which the nature of picture and sound encountered on each program unit is recorded either on the schedule sheet, the routine sheet posted by each projector, or written on the leader if this is of the type which does not already carry vital information. Possibly all three methods are not overdoing the matter, and any one of them will go far toward preventing those mysterious silent passages which are invariably succeeded by program interruptions which are difficult to explain.

Switching of Channel Speakers

But the harnessing of magnetic and optical sound equipment to the common speakers in the screen center provide one of the worst conditions to be encountered today.

Switching of the channel No. 2 speakers from optical to magnetic and back again is usually accomplished either by means of a relay or manually-operated switch.

This switching may be in itself done in such manner as to provide the maximum inconvenience to the projectionist, but the fact that in almost every case the optical monitor is so located in the circuit as to be independent of magnetic-optical switching is almost criminal negligence.

In short, if corrective steps such as are suggested herein are not taken, an ever-present possibility exists that by personnel or equipment failure the optical power amplifier may not be connected to the channel No. 2 speaker stage lines. Meanwhile, the optical monitor operates at full normal volume while no sound is being transmitted to the patrons.

Certainly this condition should be removed, and the writer suggests that a partnership between the sound service man and the projectionist should be initiated to erase this particular cause of faulty projection.

Recent Developments in Anamorphotic Systems

By G. H. COOK

Member, The British Kinematograph Society
Technical Staff, Taylor, Taylor and Hobson, Ltd., London

This inclusive article relating to the development and practical application of anamorphotic lens systems to motion picture exhibition, originally given before the British Kinematograph Society (Theatre Division), reflects the British knack for speedy marshalling and public dissemination of factual data anent current developments.

THE term "anamorphosis" as applied to optical systems implies an arrangement in which image formation occurs on different scales in the vertical and horizontal directions. There is, therefore, at some stage between camera and theatre screen, *deliberate distortion* of the original scene which must be compensated for before viewing.

The use of anamorphotic systems in itself does not provide any startling change to the appearance of screen pictures. It is a means of providing wide-screen pictures of the so-called panoramic type while avoiding some of the practical difficulties which prevent conventional systems from providing an adequate performance standard.

The limitations on the dimensions of large screens are set by the width available within the architecture of the theatre, and for height by sight lines from the rear of the seats past the balcony overhang. These limitations (and to a smaller degree the desirability of avoiding extreme picture height for viewers near the screen) spurred the adoption of pictures formats whose aspect ratios (width to height) is up to twice the conventional ratio of the 1.33/1 standard for many years on small screens.

Contentions vs. Performance

The sponsors of wide-aspect ratios contend that they permit the composition of a more interesting picture, especially if the scale of the image detail on the screen is maintained near its normal value by the use of wider-angle camera lenses embracing more extensive fields of view.

The assertion that the panoramic screen gives an illusion of depth *is not substantiated by any optical characteristic of the screen image*, having its genesis in what is called "extra audience participation."

Wide-Screen Projection Problems

When attempting to produce these large, wide-aspect screen pictures by conventional means and by standard projectors, two serious difficulties are encountered. One, the extra screen width has to be provided by shorter focal-length lenses—that is, the optical magnification between the film and the screen is increased and imperfections due to the presence of emulsion grain or lack of definition are exaggerated.

Second, the projector picture aperture has to be cropped, top and bottom, to provide the wider picture aspect ratio, therefore there is less light passing through this smaller aperture to illuminate a larger screen.

Detail Stored on Film

The visibility of the screen picture depends on a number of factors, but assuming adequate illumination and the use of a good projection lens, it depends mostly on the information stored on the film. The presence of grain in the film, either direct or reproduced from negative grain, plus the presence of camera lens aberrations and depth of field considerations, has the effect of limiting the amount of picture information that can be stored on the film.

Taking an average resolving power of 50 lines and spaces per mm. for the camera lens and film combination, we can consider the film image as a mosaic in which there are 100 individual picture elements per mm. When this is projected at a magnification of 500 times on to a 35-foot-wide screen, the picture is a mosaic where the size of each individual picture element is about ¼ inch. The visual acuity of the human eye is sufficient to discern this degree of softness of the image at distances up to about 35 feet from the screen.

Brightness of the screen image for any constant screen area is directly proportional to the total luminous flux passing through the projector gate. If the area of the gate were reduced by cropping top and bottom, the total luminous flux passing through it from the same arclamp would be reduced proportionately, and if this illuminated the same or a larger screen area, screen brightness would be reduced.

Both these types of difficulties relating to grain size, definition and illumination can be reduced by the use of anamorphotic projection systems. The variation of optical magnification in vertical and horizontal directions permits the projection of wide-aspect ratio pictures from projector gates whose dimensions make good use of the picture area available on standard positive 35-mm film.

Overall Film Area Content

The largest area that can be recorded on the film and projected by a standard projector has an aspect ratio of about 1.25/1. If all this area is to be projected on a screen having the CinemaScope aspect ratio of 2.5/1, the optical projection magnification must be twice as great horizontally as it is vertically.

To maintain correct geometrical reproduction of the original scene, the image on the positive film must be unnaturally compressed so that its scale horizontally is one-half its scale ver-

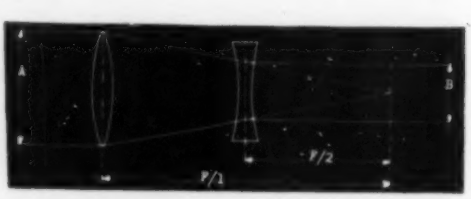
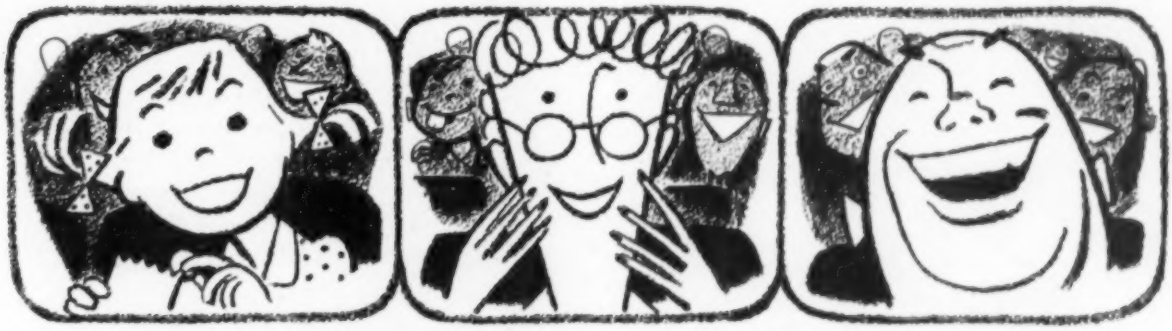


FIGURE 1
Simple telescopic system. Telescopic Power: $\frac{F_1^1}{F_1^2} = \frac{A}{B}$

SHOW THEM THE DIFFERENCE



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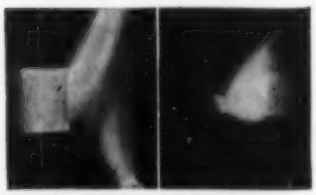

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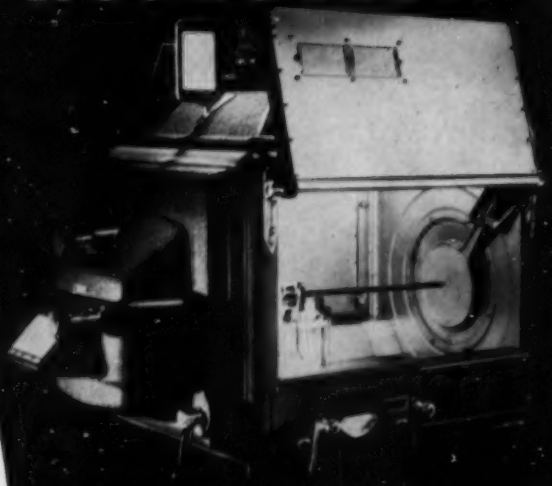

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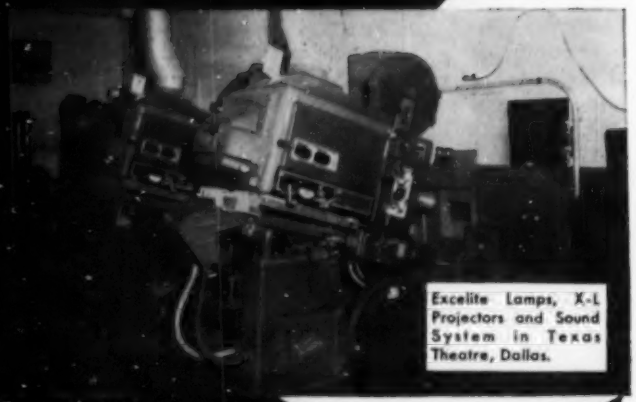

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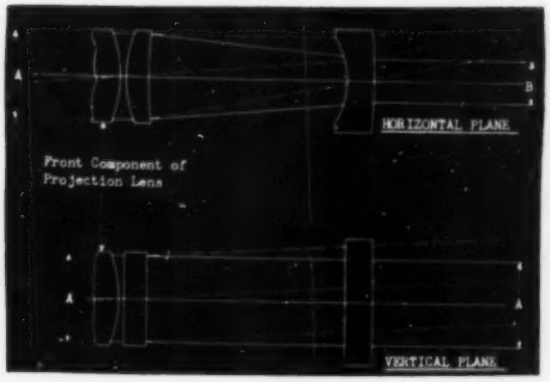

FIGURE 2
Layout of cylindrical system used for anamorphotic projection.

tically. Thus, if the original object seen by the camera was a circle, then the image on the positive film must be an ellipse, with its horizontal axis half its vertical axis. This ellipse on the positive film will be projected on to the screen as a circle.

Reduction of Negative Grain

A slide may be used to demonstrate in an approximate manner the anamorphotic reduction of the effects of negative grain and definition. These effects may be simulated by breaking up the image into a mosaic where the individual picture elements correspond to the maximum storage capacity of the film. These images when projected are enlarged considerably and should be considered as very small detail within a large-screen picture.

To compare the projected slide images, on the left of the slide may be the image which would be produced by straightforward projection at high magnification from a cropped positive picture area, and the coarse picture mosaic will be seen to have equal vertical and horizontal pitch.

On the right of the slide will be the image which would be produced by anamorphic projection onto the same screen, therefore the horizontal magnification will be the same as for the left-hand image. The vertical magnification from a maximum area projector gate, and thus from a large film area, had been halved, therefore in the vertical direction there would be twice as many elements per unit height. The overall effect of the right-hand image would show an improvement in apparent definition.

Increased screen brightness with anamorphotic projection was demonstrated by first projecting a wide-aspect ratio screen area from a top-and-tailed projector gate, and then by projecting a similar screen area anamorphotically from a normal gate having twice the height. A considerable increase in brightness was observed.

These are the basic reasons for the use of anamorphotic systems.

Available Anamorphotic Systems

Since the screen picture has to be increased in width, it is convenient to use supplementary wide-angle attachments in front of conventional projection lenses. To achieve the desired anamorphotic effects the attachment must have telescopic power *horizontally* and not telescopic power *vertically*.

Consider a simple telescope system such as that used in opera glasses. When the separation between the collective and dispersive components is equal to the difference between the focal lengths of the two components, parallel light entering at one end emerges from the other as parallel light. The telescopic power is then defined by the ratio of the two focal lengths f_1/f_2, and considering the geometry of this arrangement it can be shown that telescopic power can also be defined by the ratio of the entrance and exit beam diameters A/B. (Fig.1.)

If such a system has a telescopic power of 2 and it is positioned in front of a conventional camera or projection lens with its collective component near the lens, it will reduce the focal length of the combination by the factor 2 and double its angular field of view. Although the beam width is reduced according to the telescopic power, the focal length of the combination is reduced by the same factor and there is therefore no change in relative aperture or *F* number.

Cylindrical Prismatic Attachments

If the lens surfaces in such a telescope were cylindrical in shape instead of spherical, the system could have a telescopic power of 2 in the horizontal directions and have unit power vertically. Fig. 2 indicates the layout of a cylindrical system used for anamorphotic projection. The ratio A/B defines the telescopic power in each plane.

The optical design of the cylindrical type of anamorphic attachment requires just as much attention as the design of normal camera or projection lenses; the adequate correction of all aberrations can be achieved by the use of complex lens constructions comprising more than one lens element in each of the front and rear components.

The advantages of cylindrical anamorphotic attachments for cinema projection were first proposed and demonstrated by Professor Chretien in France some 25 years ago. The recent adoption of the method on a large scale has encouraged the development of a variety of cylindrical constructions.

Prismatic Attachments

In the search for alternative solutions to the optical problems involved in the design and manufacture of cylindrical systems, widespread use has been made of constructions employing *prismatic* components instead of lens components.

Figures 3 and 4 illustrate in a very simplified form the basic optical principle utilized in prismatic types of attachments. It comprises two wedge-shaped prisms inclined with respect to the light path in such a way that, in the horizontal plane, the ratio between the entering and emerging beam widths fulfills fundamental optical requirements.

By suitably inclining the two prisms in opposite directions, the emergent beam can be made parallel to the entrant beam (Fig. 4). In the vertical plane the flat polished surfaces of the

FIGURE 3
Optical principles used in the prismatic-type anamorphic lens.

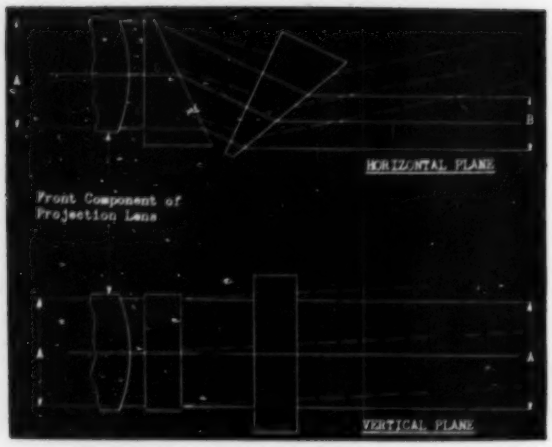

FIGURE 4
The prismatic anamorphotic attachment.

prism are parallel to one another and therefore have no effect.

Color Aberrations, Distortion

Prismatic attachments have one big advantage over all other types. They are readily adaptable to a form wherein the inclinations of both prisms may be *adjusted* to provide a range of telescopic power and thus varying degrees of picture expansion. This form will be of use to the exhibitor when he has to project different degrees of image compression. He thus avoids the necessity of using a number of different attachments each of which provides one *fixed* expansion ratio.

Although the opposed inclinations of two prisms provide correction for primary color aberrations, higher-order color aberrations are excessive and such simple systems cannot yield useful results. Furthermore, as a result of other aberrations, the telescopic power *varies across the field of view* and results in *distortion of the image.*

Adequate correction of distortion and color aberrations can be obtained by replacing the simple prisms by more complex forms.

The arrangement shown in Fig. 6 can be considered as the simplest construction to give an adequate performance at a fixed expansion ratio of about 2. This diagram also indicates a somewhat more complicated variable form which provides the same standard of performance over a small range of expansion ratios.

The prismatic developments thus illustrated were demonstrated first by the projection of a test object through simple uncorrected prisms. The color aberration was excessive, and it was explained that had the projection been over a wider screen, a variation of expansion across it would have been noticeable as a distortion of the image.

Correction of Errors

The correction of these two errors was shown by projection through a standard prismatic attachment whose expansion ratio was fixed at the factor 2 required for CinemaScope. Using the variable type, the performance was maintained over a range of expansion ratios from about 1.4 to 2 (Fig. 6).

Focusing Various "Throws"

One important feature arising from the use of *all* types of anamorphotic systems is the means adopted for focusing for different screen distances. The combined system of projection lens and attachment has different focal lengths in both the vertical and horizontal planes.

Since focusing movement of a lens is a function of its focal length, no single movement of the projection lens alone can focus *simultaneously* vertical and horizontal lines on the screen. In the case of cylindrical systems, two adjustments are necessary: one to the projection lens in the normal manner, and the other to the component separation in the cylindrical attachment.

With prismatic attachments the separation between components has no effect on focusing. Correct focus can only be achieved by setting the projection lens focused for an infinitely distant screen and utilizing at the front of the attachment a further supplementary lens system whose focal length can be adjusted to equal the screen distance.

This arrangement fulfills the condition that parallel beams of light enter and emerge from the prismatic attach-

(Continued on page 34)

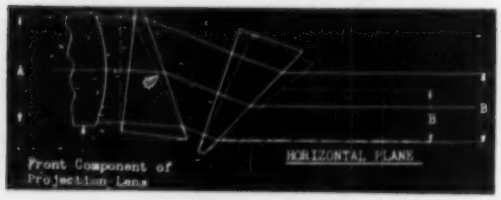

FIGURE 5
Simple prismatic attachment for a fixed expansion ratio. [See FIG. 6.]

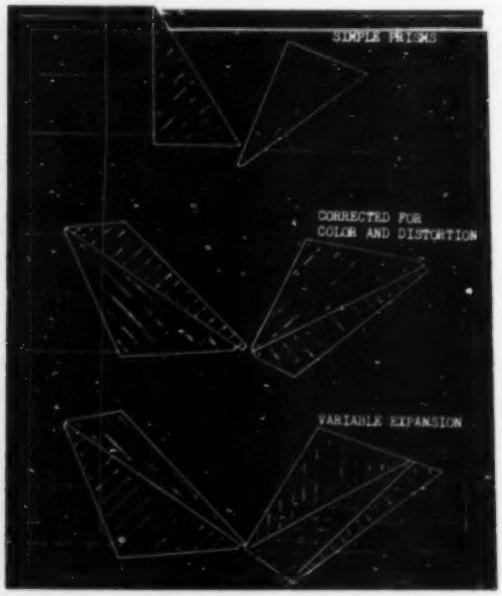

FIGURE 6
Prismatic attachment for variable expansion ratio. [Compare this drawing with Fig. 5 anent fixed expansion ratio.]

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STRONG ALSO MAKES TUBE TYPE RECTIFIERS FOR USE WITH ALL CARBON TRIMS

Efficiency of Crater Brightness With Water-Cooled Contacts and Reflector Arc-Spot Temperatures

By CHARLES E. HAHN

J. E. McAuley Mfg. Co., Chicago, Illinois

TO completely understand the problems posed by the title of this article and their relationship to each other, the writer is firmly convinced that the interested reader should, first (before attempting to pursue further the subject) obtain and read the indisputed and authoritative scientific material on the question of arc-crater efficiency as set forth in the following literature:

April, 1949 issue of S. M. P. E. Journal, Volume 52, Pages 395 to 416.

Appearing on the aforementioned pages are two articles one of which is authored by Messrs. Jones & Bowditch, of the National Carbon Co.; the other by Wolfgang Finkelnberg, Development Laboratories, U. S. Army, Fort Belvoir, Virginia.

In the summary of each article, the *conclusions were identical* and each substantiated their findings with many graphs proving in substance that:

When using water-cooled contacts, one traded it for the highest degree of arc-current efficiency present in air-cooled arcs (arcs without water-cooled contacts) when each type arc was burned at *identical* amperages.

Now, these findings are of a scientific origin and are authoritative. They are not merely unsupported mouth-to-ear statements based on self-interest.

Higher Amperage Indicated

Both of these sources indicated further that when any *real* gain in illumination was made through the use of water-cooling, it was made *only* under certain specific operational conditions at amperages *higher than normally used* for projection service, and then only with specially-made experimental carbons of the high-brightness type, which have a high burning rate and are extremely expensive. Further, these articles make it very clear that *at equal amperages*, No gain in illumination was ever recorded when standard, present-day projection carbons were tested with water-cooled contacts.

These data should settle this question here, now and for all time. In our laboratory, after averaging dozens of side-by-side comparisons of each type of arc, each with the same optics and the same type of lamp, we found, in confirmation of the aforementioned articles, that to obtain the same amount of screen illumination from a lamp with water-cooled contacts as we did from one without water-cooling, we had to make an average increase in the amperage of the arc with water-cooled contacts to 112 as compared with 100 amperes.

In other words, the writer believes that 12% represents fairly the increase in amperage and the possible increase of carbon consumption rate that it costs under these conditions to use water-cooled contacts.

Reflector-Spot Temperature

Keeping the aforementioned facts in mind, one can understand why there is *some* truth to statements that "at equal amperages, the temperature of the aperture spot from a water-cooled contact lamp is lower than that from a lamp without water-cooling." This may be a fact *only* at identical amperages; *but* what about at *identical screen illumination levels?*

Again, after exhaustive tests, our laboratory ascertained that when the identical level of screen illumination was obtained on identical reflector lamps, with and without water-cooling, each having identical optics, one aperture-spot temperature was just as high as the other — but at this point the water-cooled reflector lamp was burning at 112 amperes, while the uncooled reflector lamp was drawing only 100 amperes!

Reflector vs. Condenser Spot Temperature

To resolve this question, our laboratory again averaged out the results of many comparative tests before arriving at definite conclusions. In this case, all readings of aperture-spot temperatures were recorded at identical screen illumination levels, because we were concerned only with the question: "How much hotter is the aperture spot from a reflector arc than that of a condenser-type arc, at *identical* levels of screen illumination?"

In our tests we employed 13-mm positive carbons in the Peerless Hy-Candescent Lamp which was equipped with our standard "Hy-Speed" condenser system, which was set to produce a light beam speed of F:2.0, at which speed we obtained a screen light distribution of 77%. For the reflector arc, we used 10-mm positive carbons and a lamp without water-cooled contacts but which did have an 18-inch diameter reflector mirror which we set so as to produce its advertised light beam speed of F:1.7 — at which speed we obtained a screen light distribution of only 56%. Aperture-opening sizes were identical, as were the focal length and the F:1.7 speed of the projection lenses.

Translating the results of our tests into a simple percentage figure, we found that the reflector-arc aperture spot averaged an 18% higher thermal impact level than the aperture-spot temperature from the condenser-type arc, and, mind you, this at the *same identical level of screen illumination.* Interpreting this result as it relates to projection, it actually means that heat-filtering devices must be used with reflector arcs at lower total screen lumen levels than with condenser-type, high-intensity lamps.

Lower Screen Lumen Level

We believe that the lower lumen-for-lumen aperture spot temperature of a condenser arc is due to the greater degree of infra-red absorption from the total light beam by the condenser lenses alone, which is considerable, as compared with the amount of absorption possible by the comparatively thin piece of glass comprising a reflector mirror.

As a point of further information, we mention here that when measuring these temperatures we employed a back-of-aperture baffle having a diagonal line of three holes, all of the same size, drilled in it so that we could record the temperature of the light at the upper left corner, center and lower right corner of the aperture opening. We found that even at the same level of total screen lumens, the temperature of the light beam at the center of the aperture, with the reflector arc, at all times averaged 21% higher than the condenser-type lamp.

Crater Magnification Factor

We are convinced that this condition is the inherent result of the basic characteristics of present-day, large-diameter high "F" speed reflectors and their individual crater magnification factors. It can also contribute to a considerable amount of damage to heat-filtering devices as does the lack of tolerance to crater position drift which is greatly reduced as reflector diameters and their light beam speeds are increased: this, in effect, can practically focus the crater directly on the filtering medium, with only a slight drift of the crater away from the reflector's geometric focal point, when its working distance from the aperture is set to coincide with the distances for which its ellipsoidal curve was mathematically computed or generated.

In conclusion, certain 18-inch reflectors (free diameter 17¾ inches) advertised to produce a light beam speed of F:1.7, when they are operated at a recommended working distance of from 36 to 37¼ inches, mathematically figure to produce light beam speeds of:

F:1.80 at 36 inches

F:1.85 at 37¼ inches

Prevention of Damage To Prints

By ROBERT A. MITCHELL

The third and final article of a series relating to conservation measures in the projection room.

BLISTERING of film emulsion is likely to occur when high-intensity (H-I) arc amperages exceed 80 amperes, no heat filters or air-cooling of the film at the aperture being used. A great deal depends upon the optical efficiency of the lamp, of course, and also on the transmission efficiency of the rotating rear shutter of the projector.

While certain makes of arclamp can be operated at 100 amperes without blistering the emulsion, more efficient lamps may damage the film in this way at arc currents as low as 70 amperes!

Tests prove that rotating barrel-type shutters (Motiograph, DeVry) are the most efficient on account of their rapid double action in cutting the light beam. The conical shutter as used in the Simplex X-L has a similar high degree of efficiency because it is positioned so close to the film plane. The old single-rotor, fan-type rear shutters are the least efficient of all, passing the least amount of light even when the blades are trimmed to the point where travel-ghost just appears.

'Blistering' of Prints

Lightly-blistered film shows a fuzzy, grainy spot near the middle of each frame on the emulsion side. The center of each blistered spot has a charred appearance where the bubbles of burnt gelatine have broken through. The color of the burnt spots is brownish-gray.

Examined on the base side of the film, the fuzzy, blistered areas have a whitish, milky appearance. The burnt areas are larger in cases of heavy blistering, sometimes covering the greater part of each frame.

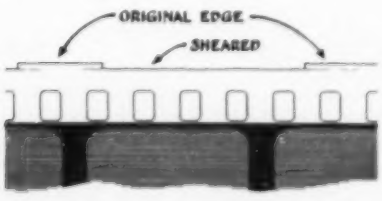


FIG. 1. Edges of film sheared by improperly adjusted pad roller.

Blistered prints are wholly beyond all possibility of restoration, and are totally unfit for projection again. Fortunately, there are two effective measures for preventing blistering, namely, infrared filters interposed between the lamp and the aperture, and air-cooling of the film in the aperture.

Water-cooling of the gate, so necessary for the prevention of buckling and physical deterioration of the film due to the effects of heat absorbed by the film base, fails to reduce the chances of blistering.

Worn, Maladjusted Equipment

Heat-buckling of the film and blistering of the emulsion, while more common than in the days of smaller screens, nevertheless comprise a small fraction of the damage inflicted on prints during projection. Aside from normal wear, most of the film damage specifically attributable to the projection process is due to worn and improperly adjusted equipment.

The scratching of prints is becoming an increasingly serious problem. We know definitely that much of this trouble is caused by CinemaScope magnetic soundheads. CinemaScope magnetic-track prints are frequently scratched by contact with the magnetic pickup and by impedance rollers which are scratched or burred, or fail to revolve freely.

Regular optical prints threaded to by-pass the magnetic reproducer are sometimes severely scratched by contact with the edges of the holes in fire-valve box and mechanism castings when the installation engineers have failed to provide the guiding rollers designed to keep the film from touching these areas.

Valve Rollers Prime Cause

Next to CinemaScope magnetic soundheads, the chief cause of scratched film today seems to be worn and jammed valve rollers in the upper- and lower-magazine fire chutes. Rollers which fail to revolve are rapidly worn down so that the middle part of the roller contacts the picture and soundtrack areas of the film and inflicts multitudinous scratches which have the appearance of "rain" on the screen and produce extraneous noise in the sound.

Periodic removal of accumulated dirt and film chips from the valve boxes is the best preventive of jammed rollers; but considerable criticism has been directed toward the design of these rollers. There is an ever-present danger of film-scratching when the middle portion of the fire rollers is not lathed down to a sufficient depth. Only the perforation margins of the film should be contacted.

Scratches and "rain" effects that weave from side to side on the screen can be blamed on the valve rollers in the upper magazine in nearly every case.

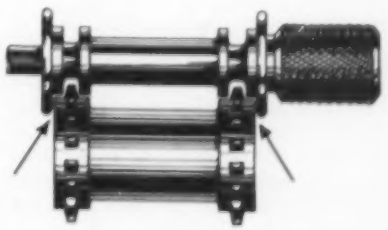
The valve rollers of most projectors require no lubrication beyond a drop or two of light oil at long intervals. As every projectionist knows, there are two types of valve-roller assemblies in wide use, the 3-roller and the 4-roller types. The latter type is the most troublesome and difficult to service. Required by law in Massachusetts and a few other localities, 4-roller fire valves are much more likely to clog and cause film breaks than the more popular 3-roller type.

The 3-roller valve assembly has two fixed-bearing rollers and a free roller which drops against them by gravity. The free roller accordingly contacts the film snugly, and yet is able to move away from the fixed-bearing rollers whenever a thick or buckled film splice passes through.

Size of Loops Important

Excessively large upper and lower film loops are another cause of scratched footage. While there is danger in loops which are too small (they may pull tight and break if the picture is framed during projection) no loop should be so large that it rubs against any part of the projector

FIG. 2. Sprocket and pad roller. The arrows point to the places where edge-shearing of the film may occur when the pad roller is set too closely to the end of the sprocket.



mechanism. Intermittent scratches which produce "machine noise" in the sound are usually caused by oversized upper loops which strike against the mechanism casting.

Loops which are too large tend to be noisy. Excessively large upper loops also induce side-sway of the picture; and excessively large lower loops, besides interfering with the synchronism of the sound, increase the chances of the film jumping off the lower sprocket when a bad splice or a torn perforation comes through.

The upper loop should be made large enough to contact the guide-roller flanges and at least a little larger than is necessary to provide leeway in framing the picture all the way up or down. The size of the lower loop is predetermined by sound synchronization. There should be 20 frames between the frame in the aperture and the corresponding point in the soundtrack at the scanning beam of the soundhead.

Synchronization is easily checked when threading up standard leader. There is a sound-synchronizing diamond printed on the film exactly 20 frames ahead of the center of each footage numeral frame.

Adjustment of Pad Rollers

Pad rollers are those that serve to hold the film against the sprockets. Most projectors have one pad roller at the upper, or feed, sprocket; most have two rollers at the lower or holdback, sprocket to overcome the natural tendency of the film to jump this sprocket. However, the film is held against the face of the intermittent sprocket by a special shoe instead of a pad roller.

Shearing of the edges of the film by the pad rollers of both the projector mechanism and soundhead is very likely to occur when the pad rollers are not correctly adjusted. Film having a sheared "guided edge" (the edge nearest the projectionist as he stands at the operating side of the projector) weaves from side to side on the screen.

Lateral adjustment of a pad roller is accomplished by threading a short strip of undamaged film on the sprocket and opening and closing the roller several times rather sharply to find out whether the edges of the film are damaged thereby. If an edge of the film is nicked or roughed by the pad roller, loosen the set-screw and move the pad-roller arm in or out, as required, and tighten. Repeat the test until a position of the roller arm is found where the edges of the film are not injured by opening and closing the roller

Adjustment of the distance between the pad roller and the face of the sprocket is also very important, for if the pad is too close to the sprocket, it will "pinch" the film and abrade the emulsion either at the side of the picture or in the soundtrack, causing "frying" noises. On the other hand, if the spacing be too great, the film may jump the sprocket.

Simple Adjustment Cited

Thread the sprocket with two thicknesses of film and close the pad roller. Adjust the stop-screw until the point is reached where the two thicknesses of film are only very *slightly* loose with the pad roller in closed position. Then tighten the locknut.

When the film jumps a sprocket and runs without immediately tearing, the teeth of the sprocket produce a series of indentations in the film, a common type of damage called "sprocketing" and "roping." It is prevented by careful threading and by proper adjustment of the pad rollers, as outlined previously.

The intermittent-sprocket shoe may damage film *indirectly*. When misaligned, the inner surface of the shoe rubs against the sprocket teeth, wearing them down to knife-like edges. The teeth then cause small straight cuts which extend downward from the pull-down edges of the perforations and well in from the corners. Similar cuts are produced by the intermittent-sprocket teeth when gate tension is too great.

This type of injury to film perforations is more apt to occur when narrow-tooth sprockets designed for CinemaScope magnetic-track prints are used.

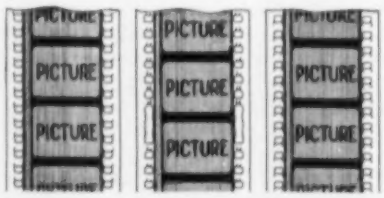


FIG. 3. *A* **shows the result of excessive gate tension and too much tension on the upper-magazine reel spindle. Note that the corners of the perforations are torn on the pull-down edge.** *B* **illustrates the damage inflicted by worn intermittent-sprocket teeth and by narrow-tooth sprockets for CinemaScope magnetic-track prints.** *C* **shows the type of perforation damage caused by worn holdback-sprocket teeth and by excessive takeup tension.**

Worn Sprocket Teeth

The condition of the intermittent-sprocket teeth is an extremely important factor affecting the longevity of prints. Undercut or hooked teeth roughen the pull-down edges of the perforations and even tear out chips of film from them. Film disengages from worn intermittent sprockets with a "tearing" noise, for hooked teeth prevent the film from leaving the sprocket freely.

Film with damaged perforations gives "jumpy" pictures on the screen.

The teeth of the upper feed sprocket are quickly worn by excessive tension on the upper-reel spindle. Some tension is absolutely essential to prevent a fully-loaded reel from spinning and piling up film in the magazine should the projector be shut down; but too much tension damages the pull-down edges of the perforations at their corners, particularly in the last 100 feet of every reel, and when small-hubbed reels are used.

The holdback sprocket of the soundhead "sings" when the takeup tension is too great. The teeth of the sprocket become hooked and the edges of the perforations opposite the pull-down edges suffer damage.

Certain projectors require greasing of the takeup friction clutch for smooth operation, but older projectors of the Simplex type work best when the leather friction disk is clean and free from oil. It sometimes happens that oil drips upon the clutch assembly from the soundhead or projector mechanism and makes the takeup action of the lower reel very irregular.

When in good condition, the friction clutch should be adjusted so that a fully-loaded 2000-foot reel will start revolving when the projector motor is switched on, but nevertheless easily restrained from turning by the touch of a finger to the reel.

Tension of Gate Pads

Gate tension is of great significance as regards projection results on the screen and print life. As a general rule, the tension of the gate-door pads should be such that the picture just begins to overshoot (jumping on the screen) when the projector is run at twice normal speed and a print in average condition is shown. But because modern projectors are equipped with neither handcranks nor variable-

(Continued on page 32)

Projection Expert—Unknown and Unknowing

Appended is a verbatim transcript of a letter to VARIETY which, because of the pre-eminent niche occupied by that publication in the world of show business, no less than its world-wide circulation, IP considers important enough to discuss in the Monthly Chat on page 5 of this issue.

Editor, VARIETY

In reviews of Tv shows your publication makes mention of the "lensing." I wish that you would similarly report on the "lensing" of movies in N. Y. houses. Motion picture projection today is nothing short of a scandal.

This last year-and-a-half I saw some 400 films in first-run, neighborhood and art houses, as well as private screening rooms, and in less than 10% were the films shown in focus. If a projector goes out-of-focus it stays out-of-focus, showing the man in the box isn't checking even once at the turnover. Is it lack of interest, lack of ability, stupidity? —or, as someone wryly suggested, just bad eyesight?

Certainly the quick demise of 3-D was due in great part to faulty projection, since the films were shown out-of-focus, out-of-alignment and out-of-synchronization, producing the blinding headaches the fans complained of. Correct projection of CinemaScope and VistaVision are likewise completely beyond projectionists today.

Managers and ushers manifest the greatest indifference when faulty projection is pointed out to them. The former know that you can fire a manager, but you can't fire a projectionist. Nothing will be done, of course, until people in numbers start to complain and ask for their money back. More don't do that, at present, because they think the fault is in the film itself, and because long suffering has taught them patience.

The steady loss of film customers to Tv has one big contributing factor that the pix people haven't faced up to: Tv shows—including the showing of movies, old and new — are brought into one's living room by *competent* technicians. Also, each Tv set is equipped with sound and focus knobs that a man can adjust himself.

If any N.Y. house would *guarantee* perfect projection and then follow through with same, watch the increase in box office receipts.

EDWARD CONNOR

To Which IP Replies:

By ROBERT A. MITCHELL, *Contributing Editor, IP*

Editor, VARIETY:

Complaints of poor focus in present-day movies — several of which have been voiced in VARIETY—are entirely justified. Not justified, however, is the abuse your correspondents have hurled at the projection craft. Conscientious projectionists resent getting blamed for a bad condition, which is not their fault.

Projectionists, by and large, are competent craftsmen who are every bit as perturbed by blurry CinemaScope and wide-screen pictures as is Edward Connor (VARIETY, July 13, p. 24). What the non-technical moviegoer does not realize, apparently, is that the picture on the screen can be no clearer than the picture on the film. And the photographic images printed on the release positive are very frequently at fault.

Better 40 Years Ago

Experienced projectionists will tell you that the average release print of 30, or even 40 years ago possessed higher pictorial quality, as regards image detail, than the average modern print.

All of the image-definition faults of standard prints are more highly magnified on the screen than they used to be in the days of conventional 3:4-proportioned screens. Moreover, the short-focus lenses required for widescreen presentation in all but the long, narrow type of auditorium exaggerate focus drift, film flutter, and "breezing"—projection defects which went practically unnoticed before the mammoth screen invaded the theatre.

CinemaScope poses special problems on account of the anamorphic lenses employed. These lenses, used on both the camera and the projector, frequently introduce slight geometrical distortions and blur the vertical edges of objects.

Outcome Not in Our Hands

Old hands at projection—skilled craftsmen in every sense of the word —deplore the poor images so often encountered in release prints. Defective prints handicap the projectionist in the practice of his art and inspire the unwarranted brickbats which come crashing through the projection-room window.

The non-technical critic ought to realize that the projectionist has nothing to do with photographing, printing, and processing the film. The man in the booth screens, to the best of his ability, the goop which is handed to him.

Color prints are a case in point. With prints made on Ansco Color and Eastman Color printing film, marvelously clear pictures may be expected. But most color prints for theatre use are made by the imbibition dye-transfer process, a method which is incapable of sufficient photographic resolution to withstand the acid test of terrific magnification upon modern wide screens.

Patrons annoyed by poor projection (and who isn't?) should complain, not to indifferent ushers, but to the manager of the theatre. The manager, like the projectionist, is intensely interested. An explanation of the trouble will then be demanded of the projectionist, and the projectionist, *the only trained technician* ply it.

If the quality of the picture on the screen does not then improve (and chances are that it won't) it may safely be concluded that the projectionist is confronted with a hopeless defect—a fault indelibly imprinted on the film, and hence irremediable. In such cases the projectionist always suffers more than the complaining patron.

Projection Optics in England

Projection Optics, Ltd., of London, England, subsidiary of the company of the same name in Rochester, N. Y., has been formed to manufacture and distribute Hilux projection optics for domestic and export requirements. Actual delivery of the Hilux-Val lens is now in progress, following various trade showings.

Westrex Co., Ltd., of London, will handle the distribution of these British-made optics.

Loew's Quarter Net Rises

Loew's, Inc., reported a consolidated net profit of $4,514,242, equal to 88 cents per share, for the 40 weeks ended June 9, as against $4,466,376 for the same period last year. Gross sales and operating revenues in the period totaled $141,272,000, compared with $138,250,000 last year, with profit in the last 12 weeks of this year's quarter dropping slightly to $1,239,791 from a comparable $1,267,210 in 1954.

Bodde Screen's New Plant

Bodde Screen and Projector Co., has opened new offices and a factory at 11541 Bradley Ave., San Fernando, California. The new plant will enable the company to increase its manufacturing facilities of seamless screens and projectors by 20,000 square feet of building area and offices.

Now audiences sit entranced ...sirens of the sea all around

They're there with their stars—within touching distance—*almost!* That's the thrill big-screen shows give as *nothing else in the entertainment-world ever has!* Part of it comes from size, of course; much of it is illusion; all of it is the result of new technics in production, processing and projection . . . technics which the Eastman Technical Service for Motion Picture Film is proud to have helped develop. Branches at strategic centers. Inquiries invited.

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New Yellow-Flame Carbons Increase Depth, Sharpness In Photographic Image

By CHARLES HANDLEY

Carbon Arc Lighting Engineer, NATIONAL CARBON COMPANY †

"If it isn't on the film it can't be projected onto the screen," is an old motion picture adage. The greatly enhanced photographic image described here must necessarily result in a greatly improved projection image. [See "What is (K°) Color Temperature" in IP for June last, p. 10.]

A new yellow-flame carbon for motion picture set lighting which provides a color distribution to match the sensitivity of present color motion picture negative makes it possible to produce pictures with much greater apparent sharpness and depth.

From one viewpoint it would seem that white light, which is composed of equal parts of red, green and blue and is represented by sunlight itself, should be the ideal balance for a photographic light source. An equally balanced white light source lends itself to easier color control when removal of some one color component is indicated, and above all, it is white light that provides most of the radiant energy for exterior photography.

The Matter of 'Color Balance'

The difficulty with the foregoing viewpoint is that incandescent tungsten lamps have certain advantages in motion picture photography, and when mixed with white light in color work, one must be filtered to match the other. It has been stated that at present it is possible to balance color film to that of a tungsten source on a much higher film "speed" rating to tungsten, and an equal speed rating to white light, than if a white light film balance were used. For this reason, apparently, professional color film is balanced to the tungsten source.

Since this change in color film sensitivity from white light to tungsten balance, it has been necessary on color sets to filter the white-light carbons to match the color sensitivity of the negative film with a resulting light loss of more than 40%. How this loss of light affected apparent sharpness and depth may be better understood by a brief review of set lighting practices.

† A Division of Union Carbide and Carbon Corp.

FIGURE 1

A scene from the Cecil B. DeMille spectacle, "The Ten Commandments," for Paramount. Director of photography is Loyal Griggs, A. S. C.

The motion picture is actually a two-dimensional medium. Physically it has only height and width. The illusion of depth in a picture is obtained by *suggestive* manipulation of perspective lines and planes. The relative size of objects is often purposely distorted in order to create the illusion of distance and scope.

Enhancement of Perspective

As an example, if the furniture in a room were made several times normal size, the characters would appear much smaller than normal. By gradually narrowing the walls, floor and ceiling of a hall it may be made to appear several times its actual length. These are physical techniques of perspective manipulation which add to the *illusion* of depth and reality.

Of equal importance are the perspective results which may be accomplished with the proper use and control of photographic light.

If adequate photographic exposure were the only requirement, it would be comparatively simple to light a motion picture set, provided the light sources were of sufficient intensity to deliver the needed radiant energy at the point of exposure. But an even amount of illumination results in "flat" light, and flat light means less object separation with its loss of apparent sharpness, clarity, roundness and depth.

It has been said that color itself will provide the separation necessary for satisfactory results, and for that reason, flat light, because of simplicity of use and assurance of overall negative density, is to be desired.

'Flat' Lighting Deficiencies

It requires only a small amount of analysis to overrule that type of thinking. Does a flower garden appear as interesting and breath-taking on a dull, dark day when the lighting is flat as it does when the sun casts myriads of variable density shadows to create the feeling of roundness and depth?

Does not the sunlight sparkle from the dew buds on the flowers add to the feeling of naturalness and beauty? A shaft of sunlight streaking across the garden wall creates the feeling of

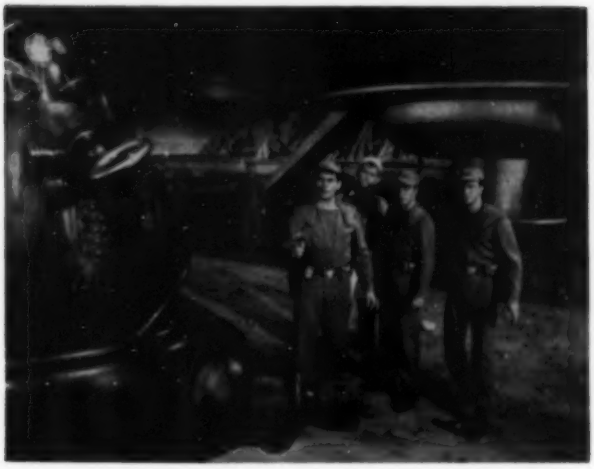


FIGURE 2
Flying saucers, robots and men from another world are featured in "Forbidden Planet," photographed for M-G-M by George Folsey, A. S. C.

depth. Flat lighting is just—well, flat.

It is true that there must be photographic density in most areas of the negative in order to obtain a satisfactory print. This phase of lighting is called "base light". Once this base light is roughed-in, the director of photography utilizes controllable spotlights and a great number of translucent and opaque light-interference mediums to model the lighting. This is sometimes called "painting with light".

'Key' Lighting Indispensable

He illuminates the areas behind pillars to make them stand out, or they will appear as though they are painted on a backing. He places powerful, directional lights to cast their beams through windows and penetrate the base light, creating the illusion of sunlight streaking across the floor. He uses light to separate objects one from the other, or from the walls of the set. He keeps attention on his lead characters by key-lighting them.

He uses carbon arc spotlights to create dramatic shadow detail which adds greatly to the illusion of reality and the overall emotional effect on the viewing audience.

It should be remembered that the final objective of the picture is to move the audience emotionally and not to get just enough light to make a satisfactory exposure.

Sometimes these lamps are 100 feet, or more, from the objects they illuminate. It takes the very powerful carbon arc with its small source size to provide the carrying power, light volume and sharp shadow characteristics that are so vital to the success of this creative work.

Yellow-Flame Carbon Assayed

In the evaluation of the yellow-flame carbon a number of directors of photography were interviewed with the object of determining individual reactions.

Loyal Griggs, A.S.C., Director of Photography on the Cecil B. De Mille current production of "The Ten Commandments" said: "I don't know how I could have shot this picture without the added power of yellow-flame carbons. It was necessary to make a perfect match of the power, directional characteristics and brilliance of Egyptian sunshine.

'Directional, Controllable' Light

"De Mille sets have always been terrific in scope, but the sets for 'The Ten Commandments' are beyond the superlatives that might ordinarily describe them. We had to have directional, controllable light sources with double the photographic effect of anything in current use. Yellow-flame carbons provided the answer."

Figure 1 shows a scene from "The Ten Commandments" wherein Griggs has accomplished a duplication of natural sunlight and has cleverly produced a single-source effect even though a multiplicity of illuminants were used. Note how the shadow detail separates the characters from the walls and suggests form and depth to the huge blocks of stone.

Color Temperature Matching

George Folsey, A.S.C., who photographed "Forbidden Planet," a Metro-Goldwyn-Mayer picture which utilizes huge space ships, king-sized robots, and even other worlds, has this to say: "I have just finished shooting 'Forbidden Planet,' using the yellow carbons—the first picture on the lot to use them. I found them extremely satisfactory, and I had no difficulty with the color temperature matching the incandescent light. I found them especially beneficial in duplicating sunlight. They were a great advantage in maintaining sharpness as far as my long shots were concerned, and I am delighted that I had the opportunity to use them."

The photography in Fig. 2 shows the shadow detail, modelling and overall single-source effect Folsey created.

Joseph Ruttenberg, A.S.C., who directed the photography of the lavish musical "Kismet", a Metro-Goldwyn-Mayer picture says: "I am now using the yellow carbons on 'Kismet,' and the results are just fantastic, sharper definition and using less units on our big sets."

In Fig. 3 note how the shadow detail and highlights duplicate sunlight just as though the scene were shot in its true locale and under ideal light

FIGURE 3
Exotic settings are used in the M-G-M production of "Kismet," which was photographed by Joseph Ruttenberg, A.S.C.

FIGURE 4. A pastoral scene from the forthcoming M-G-M film "Diane," expertly photographed by Robert Planck, A.S.C. Such panoramic views are a heavy drain upon the technical knowledge and ingenuity of a cameraman.

conditions. The highlight areas are broken up by interesting shadow detail which separates one object from the other and from the set background, giving the illusion of depth.

Delicate Lighting Balance

Robert Planck, A.S.C., did some outstanding painting with light on his Metro-Goldwyn-Mayer picture "Dianne," which is laid in the 16th Century. Fig. 4 is a pastoral scene which required deft handling of all types of lighting equipment and controls in order to provide a soft but directional illumination and balance to keep the main characters as high points of interest while providing maximum object separation. Fig. 5 is another scene from "Kismet" in which sunlight coming through the window is carefully balanced with controlled "fill" light to properly illuminate the characters without too much "spill" light on the walls.

Harry Stradling, A.S.C., who was assigned to direct the photography on Samuel Goldwyn's picture "Guys and Dolls" almost snatched the new yellow carbons from the furnace in order to obtain the light volume and carrying power he needed for a huge double street scene. He had them brought out by airplane and put into production immediately.

"My early evaluation of the new yellow-flame carbons was fully justified," he said. "They provided twice the carrying power and light volume of any other lamp I could use, and they played a major part in the successful photography of the picture. They were particularly valuable in the shooting of the riotous Latin night spot scene where much of the light was coming through latticework and where it was necessary to use a high level of illumination and stop action with narrow shutter opening. I used all the 'Brutes' (huge arc lamps) I could get."

Previous Focus Compromise

Before the advent of wide-film processes and huge screens, the use of comparatively large camera apertures allowed some color pictures to be shot as low as 200 foot-candles for the key lighting. It was possible to compromise with depth of focus when shooting a large set for small-screen viewing because the theater audience could view the entire picture without scanning and, therefore, kept focus largely on the main action. Also, the objects in the long shot were so small that no attempt was made by the viewer to focus on individual characters.

Rather than providing true scope to the picture, these interior long shots were often merely a *suggestion* of scope that depended upon establishing medium shots and closeups to carry them over.

At the present time, with large-screen presentations, the viewer wants to recognize each character in a long shot and to be able to scan the picture with all areas in sharp focus. This has resulted in smaller camera apertures for increased depth of focus and has raised the key lighting levels to as high as 1,000 foot-candles, or higher.

FIG. 5. Another scene from the M-G-M "Diane," photographed by Robert Planck.

The "Brute" (Mole-Richardson Co.) which is the major studio set lighting carbon arc spotlamp, even though filtered for a light loss was still adequate to overcome the lower set lighting levels, but not to do proper painting with light over the higher base lighting levels when the lamp-to-object distance was great.

High Filter Loss Eliminated

A lamp with twice the power input was called for, one that would provide twice the photographic effect of the filtered lamp with white-flame carbons. This increase was obtained by changing the color characteristics of the carbon arc source to meet the sensitivity of the film and thereby eliminate the need of a heavy filter loss, rather than by doubling the power input.

In process projection, where a picture is projected on and through a translucent screen, then photographed from the opposite side where it forms the background for a set, the yellow-flame carbon has been accepted as almost a miracle.

As previously stated, this yellow-flame carbon gives approximately the same amount of visual light as a standard white-flame carbon of similar physical characteristics, but its *color balance* has been changed to match the film sensitivity. Whereas it was necessary to throw away over 40% of the total light with the white-flame carbon by the use of a heavy filter, the yellow-flame carbon does the job with negligible filter loss.

60-Degree Intermittent

To the Editor of IP:

IN THE February, 1955, issue of IP, page 7, there appeared an article by J. G. Jackson entitled "A 60-Degree Geneva Intermittent Movement" which I find very original and interesting. However, I believe this design of intermittent is rather complex for cinematography projection, *etc.*

I also read the IP comments upon the proposed Jackson intermittent, and I find some mistake in the following paragraph:

> "Then, too, no difficulty would be encountered in adapting these movements to 16-mm applications, it being necessary only to substitute a 4-tooth, 16-mm sprocket for the 35-mm sprocket."

I doubt if one four-frame (4-tooth) 16-mm sprocket may handle the film without tearing it.

A four-tooth, 16-mm sprocket is only about $\frac{3}{8}$-inch in diameter. With one 8-frame (8-tooth) sprocket, the Maltese cross or star will be 8 slots, thus a 135-degree pull-down is obtained. A 135-degree pull-down intermittent is not efficient for projection. However, a solution is to employ one or two accelerators to bring the pull-down period about 57-degrees, or use a four-point star geared down to one 8-frame sprocket by means of two constant-velocity ratio gears, 1-to-2.

Design Widely Employed

The first design is widely employed at present on 16-mm projectors, such as Kodak Model 25, Duiker, Hortson, Philips, Leitz and others. The second design is used in the German Bauer Selection projector.

To return to the 60-degree intermittent for 35-mm projectors: in 1920 the Pathescope Co. introduced in America a clever intermittent movement with only a 60-degree pull-down period, the mechanism being known as the "Eccentric Star Intermittent," as described by W. B. Cook in Transaction No. 10 of May, 1920, the *Journal* of Society of Motion Picture Engineers, page 70.

This intermittent was designed with a standard four-point star but with slots milled out of the normal axis of the conventional star. This intermittent had a large cam pin, and the shutter used was the same as that illustrated in the article by Mr. Jackson. It had three equal blades and three equal openings each of 60 degrees, thus the same light delivery onto the screen, but with 72 cycles frequency, hence a truly flickerless shutter.

The writer heard some time ago about a British patent relative to this redesigned intermittent movement hold by E. Moy & Co.

JOSE M. RUIZ
Box 82, Santa Clara, L. V., Cuba

Many Thanks, Brother

To the Editor of IP:

I wish to commend you upon the excellence of your publication. It's a wonderful aid to the projectionist and just about the only source of current understandable technical information.

CHARLES V. FRANKS
Washington, 7, District of Columbia

Splicing Film Properly

To The Editor of IP:

What is all this stuff about how to "properly" splice film? This chore is a cinch and does not require a long list of procedural "instructions" for the benefit of any projectionist who can put on a good show with today's diverse and sometimes complicated equipment.

All that is needed is the right equipment and a little common sense. The former consists of a good splicer with an even tension on the splice, an even flow of cement after the film is made ready, and last but not least a good fast-action cement.

We are told that the only way to get an even flow of cement on a splice is to use a good cement brush. Yeah? Well, there never was a *good* cement brush nor a good cement bottle.

Sandblocks Available Free

It was stated rceently in I.P. that a little sandblock helps greatly in making the film ready for splicing. The writer agrees, because he was the first to make such blocks and he introduced them into the projection field. I will gladly send such a block *free* to any projectionist, who can see how its done and from there on make his own. Just drop me a card.

Now, as to an even flow of film on the made-ready splice. Drop into any drug store and for about 25 cents obtain a small bottle with a perforated applicator top. It takes a little practice with this applicator to get the knack, but once you do you'll have the best you ever used and with always an even flow of cement on the splice. If you can't get one, send me 25 cents and I'll send one to you.

Give this a try. We who make film cement and are extremely interested in its proper application have proved its worth. You'll find it 100% better than any brush or messy cement bottle ever produced. —R. J. FISHER, Fisher Mfg. Co., 1185 Mt. Read Blvd., Rochester 6, N. Y.

EDITOR'S COMMENT: It was never any great risk to splice film when due care was exercised. Recent comment in IP and elsewhere is traceable to the introduction of various new processes and, believe it or not, the continuing existence of some nitrate stock not properly identified..

As for DuPont's new Cronar film, still in the experimental state and therefore of no great concern to projectionists at the moment, it must be remembered (and will be emphasized again and again at the proper time) that this stock is not soluble to and therefore does not permit of splicing with present film cement.

DuPont was forced, therefore, to devise a new means for its splicing. Happily, the method devised makes possible the splicing of Cronar not only to itself but to any other film base. This method and the unit employed have been greatly simplified since they were described in IP for March, 1955, p. 7.

Kodak Sales, Net Away Up

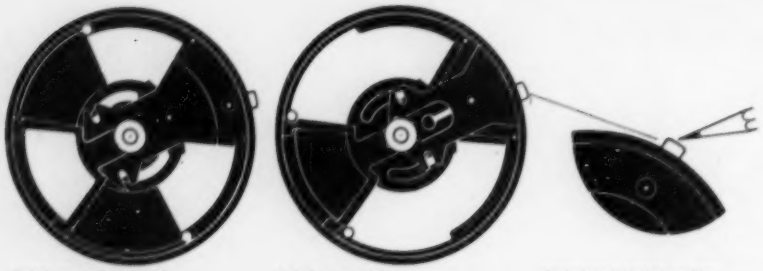
Sales and earnings of Eastman Kodak for the first half of 1955 (24-week period ending June 12) were at the highest levels in the company's history. Consolidated sales of Kodak's units in the U. S. for this period amounted to $315,850,102, an increase of 13.6% over last year's corresponding figure of $278,132,132. Sales also topped by 11% the previous Kodak first-half record of $286,382,170, set in 1953.

Net earnings after taxes amounted to $36,365,989, an increase of 29% over earnings for the first half of 1954, and equal to $1.97 per share on 18,277,260 common shares outstanding, compared with $1.60 a share on 17,401,845 shares outstanding at the close of the 1954 first half. Common shares outstanding were increased following the payment of a 5% stock dividend last March. Earnings were 11.5% of sales compared with 10.1% in the corresponding period in 1954.

Particularly good gains were made by various types of film, including color films, 8-mm amateur film, films for the graphic arts, and professional motion picture films.

YOUR BEST BUY
U. S. SAVINGS BONDS

Double-Gaited 16-mm Shutter by Eastman



Switch on at silent speed
The Super-40 Shutter automatically presents three shutter blades. With three light interruptions per shutter revolution . . . and 16 frames-per-second operating speed . . . the Pageant develops 48 light interruptions per second. Comfortable, flicker-free projection with standard illumination.

Switch to sound speed
The Super-40 Shutter shifts automatically to two blades, and screen illumination is increased by more than 40%! Yet at 24 frames-per-second sound speed, there are still 48 light interruptions per second . . . and your movies, though amazingly brilliant, are still comfortably free from flicker.

Or lock in 3-bladed position
For those occasions when you don't need the extra brilliance of a two-bladed shutter—projection in very small rooms, for example—a special latch lets you lock the shutter for standard illumination. And when you wish to return to automatic control, just release the locking lever.

A NEW SHUTTER for Kodascope Pageant projectors, which shifts automatically between two- and three-bladed positions, provides increased screen illumination while retaining freedom from flicker during showing of both sound and silent motion pictures, has been developed by Eastman Kodak. Called the "Super-40 Shutter" the new device is regarded as one of the greatest advances ever achieved in 16-mm sound projection.

With the Super-40 Shutter, the Kodascope Pageant becomes the first truly all-purpose machine. Equipped for both sound and silent projection it is capable not only of projection under "normal" conditions, but also for use under difficult conditions of illumination, in hard-to-darken rooms, in large halls, and wherever additional screen brilliance, extra-long projection throws, or unusually large images are required.

Automatic Switching Facility

Operated at 16-frames p.s. silent speed, the Super-40 Shutter presents three blades and provides a flicker-free, 48-light-interruptions-per-second. When the projector is operated at sound speed, the additional centrifugal force produced actuates a mechanism that changes the shutter to two blades. At sound speed, the shutter transmits more than 40% additional illumination, yet still maintains the eye-easy, 48 flicker-free rate.

For those occasions which do not call for the extra brilliance of a two-bladed shutter, a special latch permits the operator to lock the shutter for standard illumination. The Super-40 Shutter returns to automatic operation when the latch is released.

The new device meets the need which projector manufacturers and users have long recognized as essential for additional projector illumination. Greater brilliance has been needed to make possible the larger screen sizes required in modern 16-mm projection. Improved room-darkening techniques have provided a partial solution, as have the incorporation into 16-mm projectors of faster lenses and lamps of greater capacity.

The key to the question of light transmission has *always* been the projector shutter, and it is this problem which the Super-40 Shutter has solved.

Ray Brian — Ace Archivist

PART III of the listings from Ray Brian's (IA Local 434, Peoria Illinois) enormous and detailed collection of projection equipment and information dating back to Edison's "Kinetoscope" of 1889. The Peoria projectionist has gathered a list of over 350 different makes of machines, is aiming for more.

Except for those marked with an asterisk, Ray has photos of every projector listed — 212 photos in all — and would appreciate any additional contributions to his famous lot. Ray may be contacted through IP. The third lineup follows:

CINAGRAPHOSCOPE — made about 1900.*
CINCHRO — made in England, 1921.
CINELUX — made in France about 1931.
CINEMATOGRAPHE — Lumiere Bros., Lyons, France, 1896.
CINEMATOLABE — Lumiere and Carpentier, France, 1896.*
CINEMECCANICA — made in Italy, 1948.
CINEMAPLAQUE — made in Italy by Gianni Bettini, 1912.
CINESCOPE — made by Ernemann for Cinema Traders Ltd.
CINEMATOSCOPE — Birt Acres, 1896.*
CINOGRAPH — about 1900.*
CINOMOGRAPH — about 1900.*
CINOSCOPE — about 1900.*
CLIMAX — . . . *
COMES — a continuous projector using eight lenes, 1928.
COSMOGRAPH — made in Morehead, Ky., by E. E. Maggard, 1920.
COSMONOGRAPH — made about 1900.*
COSMOSCOPE — made before 1900.*
CRITERIOSCOPE — J. B. Colt Co. (Unger and Krug patent), 1897 to 1900.
CRONE — . . . *
CUNOSCOPE — made before 1900.*
C and W — Made in Australia by Cummings and Wilson since 1920.
CYNNAGRAPH — made before 1900.*
DAFATONE — made in Israel.*
DAY — made by Will Day in London, 1918.
DE BEDT — made before 1900.*
DeVRY — Herman DeVry, since 1914.
DIARAMISCOPE — made about 1900.*
DOM MARTIN — made about 1900.*
DRESDEN — made in Germany, 1954.
DRESSLER — made by Charles Dressler, 1908.*
DUPLEX — M. P. Industries, New York City.*
DUPLEX-ACE — S.O.S. Cinema Supply Co., New York City, 1929.

[TO BE CONTINUED]

SMPTE Color Tv Test Films

Color Tv test films in both 16- and 35-mm film, plus slides, are now available from the Society of Motion Picture and Television Engineers. The prints measure the optimum quality of color material obtainable from Ansco, Technicolor, and Eastman prints. The picture-only films consist of three sections of five scenes each. Beginning with the first scene, a gray scale is included which can be used in set-up for adjusting the signal-generating equipment so that the color sub-carrier vanishes.

The same high-quality color picture material used in the test films is found on the 2-inch square color slides. A black-and-white chart of the alignment and resolution target used in the standard Tv test films is included. Scenes in both slides and films were illuminated for shooting with a lighting ratio of approximately 2/1, *i.e.*, the light "key" was twice the "fill" light, as measured in foot-candles.

Interiors, exteriors and a wide range of colors are included in the scenes, all of which contain one or two persons. Most were medium shots, with an occasional close-up.

The 35-mm color Tv test film, 700 feet long, costs $95; the 16-mm, 280 feet, is $50, while the set of ten slides is $25. Obtainable from SMPTE at 55 West 42nd St., New York City, 36.

Isolate Pure Substance

Chemical which makes cells divide has been isolated in pure crystalline form by University of Wisconsin scientists. The chemical, called kinetin, is obtained from a compound known as DNA or desoxyribonucleic acid, a component of chromosomes. When a trace of the substance is added to culture media for plant tissue cells which are past the growth period, the cells divide and new cells form so long as the chemical is in the medium.

Splices in Negative Showing Through Positive Prints to the Screen

ONE of the outstanding characteristics of modern movies is the *unobtrusiveness* of the projection process. The days of frequent misframes, dirt in the corners of the apertures, and accidental losses of light are definitely past. It is a serious matter, therefore, when the release print itself contains defects which draw the attention of movie audiences from the screenplay to the mechanics of the presentation.

CinemaScope prints unfortunately contain an annoying flaw which audiences find distracting and which projectionists believe to be unnecessary. It is due to the use of standard negative splices which, printed through onto the positive film, show up on the screen at every single change of scene because the CinemaScope apertures are too large to conceal the splice images.

Splice-Line Positioning

As all projectionists know, the large number of individual scenes that make up a finished picture are spliced together in the negative; and when the negative is printed, a faint image of each and every splice prints through. In regular non-anamorphic prints, images of the narrow negative splices occur *inside* of the comparatively wide framelines, and hence are not visible on the screen to mar the picture. Not so in the case of CinemaScope prints, all of which utilize full-height frames separated by very narrow framelines.

Even though negative splices are quite narrow — narrower than the regular positive splices used for repairing prints — they nevertheless overlap into the picture area at the top or bottom of the frame at each splice when the picture is in CinemaScope. To aggravate the situation, the vertical dimension of the CinemaScope projector aperture is so great (0.715 inch) that it includes nearly all of the height of the picture on the film, permitting the printed-through images of the negative splices to flash on the screen.

The negative-splice image is visible as a horizontal white line — thin, but very conspicuous — near the bottom (sometimes the top) of the projected picture at each "cut" or change of scene. The projectionist has practically no leeway at all in framing because the CinemaScope aperture is so large, precluding all possibility of masking the splice images by careful manipulation of the framing knob. The thin white line invariably flashes across the picture at every cut.

Projectionists are expected to notice visual flaws in motion pictures; their job to keep a critical eye on the screen even when engaged in the numerous other essential room tasks. But the visibility of negative splices in CinemaScope pictures, sad to relate, also smacks theatre patrons in the eyes. A moviegoer would have to be nearly blind not to see them.

Suggestions for Improvement

Something must be done about this visual flaw of CinemaScope films. But *what* can be done, *should* be done? A new method of splicing CinemaScope negatives appears to offer the best solution of the problem. Splices that are still narrower — really "hairline" — across the picture area (no matter how wide in the perforation margins) would surely eliminate the annoying splice-image lines in CinemaScope release prints. Another idea involves a hairline paint-over on the splice images on the master positive from which the dupes are made, the theory being that a thin black line isn't as noticeable as a white line. Plastic-tape splicing, similar to that used with Du Pont "Cronar" stock, is another possible way out of the predicament.

However the trick is turned, the removal of negative-splice print-throughs on CinemaScope positives demands the most serious attention on the part of studio technicians. The accomplishment of this particular job is an end which would seem to justify almost any means.

Old-Time Movies Restored by a Novel Process

OLD-TIME MOVIES on rolls of paper, like so many adding machine tapes, today are providing Hollywood its first real link to the very beginnings of motion pictures

The paper-film prints of early-day flickers have been resting — and deteriorating — in the vaults of the Library of Congress at Washington, DC., ever since they were first filed there for purposes of copyright. Until 1912 that was the only legal way to copyright a movie — by filing a print of it on paper.

These "still photos" of pictures that moved are about two inches wide — it varies a little — and anywhere from three to 3000 feet long, and many of them are without sprocket holes, for it wasn't meant that they were to be projected. Fact is, most of them never had been projected. The first successful screen projector didn't come along until about 1905; before that movies could only be viewed in "peep show" fashion.

'Misshapen Paper Positives'

The paper positive prints — for that's what they are — were filed away in tight rolls which often shrank together into tight, misshapen masses on which the picture images were faded, if they could be discerned at all.

But they are invaluable, for they are all that remain of most early-day motion pictures. They represent the beginnings of movement in photography. All of the original negatives have become lost, and what later dupe negatives there were hav long since crumbled to powder.

So it is from the treasure trove of paper "films" now that a whole new set of celluloid negatives is being made through a joint project of the Academy

MOTION PICTURE FILM & EQUIPMENT EXPORTS IN 1954

Here are the figures, as compiled by the Motion Picture Division of the U. S. Dept. of Commerce, relating to the export of motion picture equipment, visual and aural combined, for the year 1954.

	JANUARY-MARCH 1954		JANUARY-MARCH 1955	
CAMERAS:	*Number*	*Dollars*	*Number*	*Dollars*
35-mm	39	83,367	59	207,638
16-mm	1,251	141,903	1,129	156,379
8-mm	6,405	190,201	8,543	254,299
TOTAL	7,695	415,471	9,731	618,316
PROJECTORS:				
35-mm	373	203,957	342	164,756
16-mm Silent	440	53,408	1,077	72,199
16-mm Sound	2,091	648,232	1,954	623,207
8-mm	2,533	113,622	4,777	233,249
TOTAL	5,437	1,019,219	8,150	1,093,411
OTHER EQUIPMENT:				
Sound Recording	—	133,278	—	149,561
Sound Reproducing	—	501,276	—	668,025
Arclamps	207	87,496	581	112,940
Screens	—	516,009	—	265,403
N.E.C. & Parts	—	524,090	—	524,000
Studio Units	—	282,252	—	432,966
TOTAL		$2,044,401		$2,152,895

of Motion Picture Arts and Sciences and of the Library of Congress, financed by the Academy.

The tedious copying job onto new negatives, frame by frame from the faded prints, is being done with equipment especially designed for the purpose, at a small laboratory in Hollywood known as Primrose Productions, Kemp Niver, manager. After two years of laborious effort, he and his small staff have duplicated 70,000 feet of film, involving 334 titles. They have nearly 2,000,000 feet to go before they are done, involving several thousand titles, many of them not yet identified.

Niver devised his method after various laboratories and technicians had tried to reproduce the paper images with conventional film printing equipment and found it impractical. Trained as a lawyer and formerly a private investigator, but wholly unschooled as a film technician, he solved the problem by applying the thinking and methods of an investigator until he found a way that did work. And then built a machine like none other with which to do it.

He has already recreated what is believed the first movie to be copyrighted in this country — a tiny piece of film entitled "The Sneeze," for the action it depicted. Dating back to 1889, and copyrighted in 1892, it consists of exactly 45 frames, original running time one second, but stretched now to 15. More impressive that way.

Nothing New Under Sun

One of the most exciting of his reproductions is the very first, circa 1898, production of Jules Verne's "Twenty Thousand Leagues Under the Sea," made in France by George Melies in collaboration with the author Verne himself. It runs seven minutes and its footage includes such supposedly much later technical tricks as lap-dissolves, animation mixed with live action, underwater photography, pan and dolly shots.

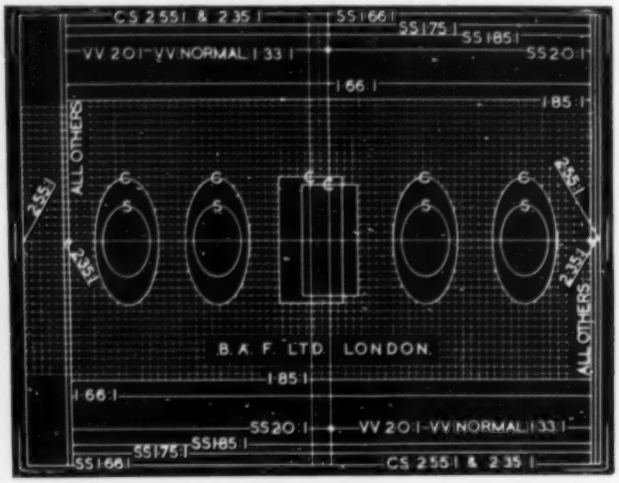
To do all this, Niver and his staff first have to soak the paper rolls in a chemical bath and water, and then carefully unroll them a few inches at a time. In the case of early celluloid negatives from whatever sources, the film must first be painstakingly patched with clear plastic before any copy can be made.

And since the early silent films were photographed at different camera speeds than now prevail, Niver has to compensate for that, too, in order to project the pictures through modern machines. In doing so, he has somehow eliminated the flicker that characterized the early silents, and at the same time improved the picture quality. The pictures as he reproduces them are better than their makers ever imagined they could be.

Niver is aware of the psychological hazard in eliminating the flicker, for flicker lends a persuasive nostalgic touch to old movies. But he is convinced that progress — even in pictures older than a half-century—is both inevitable and commendable. So out goes the flicker, and posterity may make what it wishes of the omission.

[NOTE: The foregoing is a condensation from AMERICAN CINEMATOGRAPHER for July, 1955, p. 392.]

Inclusive Test Film by British Acoustic Films



Representation of the alignment test target film available from British Acoustic, inclusive for all projection conditions.

FILM workers in England and in member countries of the British Commonwealth (wherein IP has substantial circulation) will be interested in a new test target film covering most types of projection systems in use today which has been made available by British Acoustic Films, 37-41 Mortimer St., London, W. 1, England.

Outlines are provided which indicate the positions and dimensions of *both* types of CinemaScope apertures: that which corresponds with the aperture used on film with magnetic tracks is marked 2.55:1; that for the aperture used on film with a photographic sound track is marked 2.35:1. These figures, of course, correspond with the aspect ratio of the projected picture.

Target Line Identification

The target contains two vertical centre lines, one corresponding with each of these two CinemaScope apertures. It also contains two rectangles centered on these centre lines, and four elipses marked with the letter "C". These four elipses and the two rectangles are so proportioned that they would appear as circles and squares, respectively, when correctly projected with an anamorphic expansion ratio of 2:1.

In addition, the target contains top and bottom frame limits as used in the Superscope system, which, when projected with an anamorphic lens having an expansion ratio of 1½:1, give projected picture aspect ratios of 1.66:1, 1.75:1, 1.85:1 and 2:1. These lines are designated by the letters "SS" in front of the figures, denoting the projected picture aspect ratio. Four elipses marked with the letter "S" are also provided; these will appear as circles when projected with an anamorphic expansion ratio of 1½:1.

Inclusive Single Section

The target also contains the outlines of the old standard aperture, giving a projected picture aspect ratio of 1.33:1. These lines, of course, coincide with the Superscope 2:1 and the proposed Vista-Vision 2:1 apertures, because both these latter systems use an anamorphic expansion ratio of 1½:1. Also shown are aperture limits for 1.66:1 and 1.85:1 picture aspect ratios as obtained by masking down standard prints.

The background of small squares is provided to enable uniformity of focus over most of the screen area to be checked. White markings on a black background have been chosen because this type of picture is much less tiring to look at than one which contains black-on-white markings.

The film is normally supplied in 200-foot lengths.

Film Theatres' 1 1/3 Billion in '54

Motion picture theatre box-office collections totalled $1⅓ billion in 1954 as compared with $1¼ billion in 1953. In 1954 the film industry accounted for $964,000,000 of national income, topping the 1953 mark of $839,000,000. The industry also surpassed its 1953 figure in salaries payed with $709,000,000 in 1954 as against $678,000,000 in 1953.

In 1954 the film industry had 206,000 "full-time equivalent" employees, compared with 209,000 and 216,000 in the preceding two years. Industry workers' earnings averaged $3,442 annually in 1954, compared with $3,244 in 1953. Those engaged in film industry production totalled 217,000 in 1954, compared with 220,000 in 1953.

What Do You Know About Carbons?

The third of a series of questions and answers which explain the unique nature of carbon and describe how the substance is utilized so as to provide the brightest of all artificial light sources. Data provided by National Carbon Company.

Define 'Incident Lumens'?

Screen light is frequently expressed in "*incident lumens*" which is a measure of the total useful light output of the carbon arc lamp and projector mechanism. To measure the screen lumens in any particular case, the screen may be divided into small areas of substantially uniform illumination, and the magnitude of the illumination in foot-candles measured in each such area.

The foot-candle values thus obtained, multiplied by the associated area in square feet gives the total lumens for that area; and the summation of these lumen values for all the areas gives the total screen lumens. Light measuring devices calibrated to read directly in foot-candles are available for making such measurements.

How Does One Determine 'Average Illumination'?

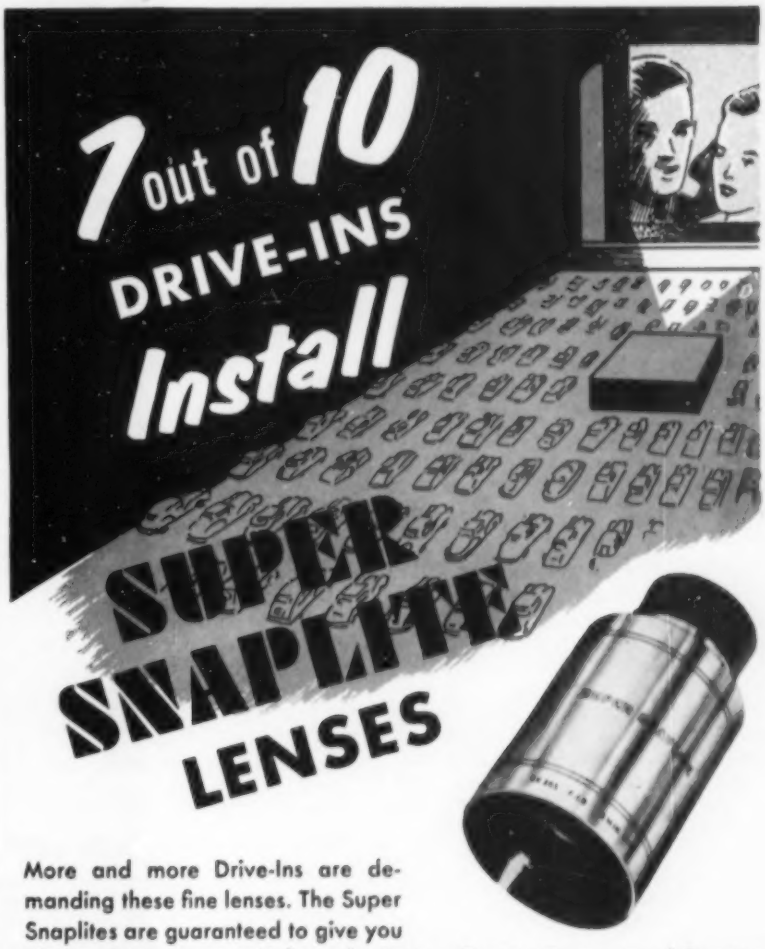
If the total lumen output is given for a particular projection system the *average illumination* in foot-candles for any given size screen may be obtained by dividing the total available lumens by the area of the screen in square feet.

For example, if a projection system delivers 3,600 lumens to a screen 300 square feet in area the average light intensity on the screen will be 3,600 divided by 300 or 12 foot-candles which is equivalent to 12 lumens per square foot. In all practical cases, however, the light is not distributed uniformly over the screen area in this fashion; the light intensity at the sides of the screen is usually 60% to 80% of that at the center.

Why the Term 'Screen Light Distribution'?

The term "*screen light distribution*" is used to express the degree of uniformity of screen illumination. Ordinarily this term is simply the ratio of the illumination near the edge of the screen, on a horizontal center line, to the illumination at the center. A "*screen light distribution of 80%*", frequently more precisely expressed as "*the side to center distribution ratio*", simply means that the side illumination is 80% of that in the center.

If such measurements are to be reliable, care must be taken to align the lamp optical system properly and to hold the arc crater precisely on the



More and more Drive-Ins are demanding these fine lenses. The Super Snaplites are guaranteed to give you Sharper Pictures, More Light on the Screen, Greater Contrast, and Greater Definition...and this under the most trying outdoor operating conditions. Actually 7 out of 10 new Drive-Ins install Super Snaplite Lenses...and more and more established Drive-Ins are turning to Super Snaplites. Ask for Bulletin No. 222 it gives you complete information on these lenses.

KOLLMORGEN Optical CORPORATION

Plant: 347 King St., Northampton, Massachusetts

New York Office: 30 Church Street, New York 7, N. Y.

desired operating point so that the screen will be symmetrically illuminated at optimum value.

'Brightness' and 'Foot-Lamberts'

The amount of reflected light depends upon the original character of the screen surface as well as its age and conditions of cleanliness. In the case of the motion picture screen, the term *"brightness"* refers to the light per unit area reflected from the screen. The *"foot-lambert"* is the unit of *"brightness"* ordinarily used to define the amount of light per unit area reflected from the screen.

A perfectly diffusing surface reflecting light at the rate of *one lumen per square foot* is said to have a *brightness of one foot-lambert*, and it appears equally bright from all angles of view.

Does Screen 'Brightness' Vary?

The *brightness* of a screen which is not perfectly diffusing will generally vary with different angles of view. Some screens with directional properties (such as silver screens and beaded screens) concentrate the reflected light in one direction and may, therefore, appear much brighter in this direction than a perfectly diffusing surface reflecting the same total amount of light.

Explain 'Apparent Reflectivity'

The *apparent reflectivity* of a screen in any given direction is defined as the ratio of the brightness in foot-lamberts to the incident intensity in foot-candles. For diffusing type (flat white) screens the apparent reflectivity is approximately constant over a wide angle of view and generally does not exceed 75% to 90%.

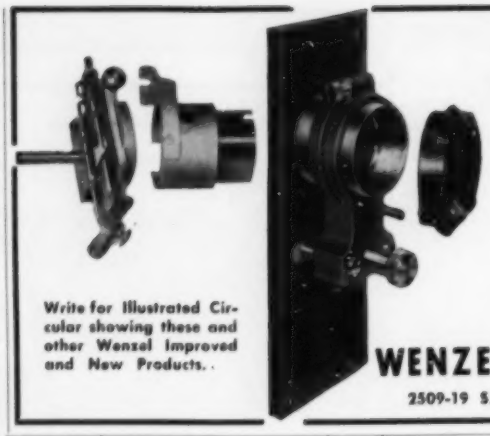
Dirt and age may, in extreme cases, reduce these values by as much as one half. A directional screen may have an apparent reflectivity of 200% or 300% in a selected direction and fall much below 100% in other directions.

This *apparent reflectivity* must not be confused with the total or *overall reflectivity* of the screen which measures the ratio of the total light reflected in all directions to that incident on the screen and which will always be less than 100%. Information on the reflecting power of any given screen *in its original condition* can be obtained from the screen manufacturer.

In the example cited previously the method of calculating the average intensity of the light delivered to the screen was shown and an average value of 12 foot-candles, or 12 lumens per square foot was obtained. Let us assume that this is a perfectly diffusing screen with a reflecting power of 75%. This means that 75% of the light delivered to the screen is reflected and that 25% of this incident light is absorbed by the screen.

Therefore the quantity of light reflected by this screen or its "brightness" will be 75% of the incident light (75% of 12 lumens per square foot) or 9 lumens per square foot which by definition is equivalent to 9-foot-lamberts.

[TO BE CONTINUED]



Write for Illustrated Circular showing these and other Wenzel Improved and New Products.

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PRO 55

to be used in conjunction with the PRO 47.

EW 78

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B&L 16-mm C'Scope Lens

A 16-mm CinemaScope projection lens system that will adapt to all popular 16-mm projectors was announced today, July 30, 1955, by Bausch & Lomb, Rochester, N Y. It is a combination prime and anamorphic single-barrel lens, listing at $124.50 with an adapter, available in 2-inch focal length. Other focal lengths will be made available, if demand warrants. When used at the same throw distance as a regular lens, the lens will produce an image twice as wide.

Earlier Errors Corrected

B & L has designed its lens to include a prime lens system so as to avoid the danger of imperfect projection that could easily develop through *standard* 16-mm lenses, because the latter were not designed for the increased horizontal magnification. The B & L CinemaScope lens requires no brackets or supports, is 6⅞" long and weighs only 7¾ ounces.

Bausch & Lomb's new CinemaScope 16-mm projection lens, with proper adapters, will fit any existing 16-mm projector.

The new lens will make it possible for thousands of small theatres around the world, industry, institutions, clubs, and military installations to project any standard CinemaScope prints, which it is understood will soon be available through the usual channels. Further details from B&L, Rochester, N. Y.

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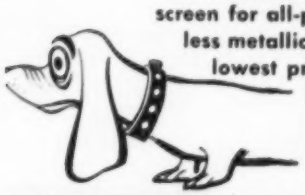

RAYTONE Screen Corp. 165 Clermont Ave., Brooklyn 5, N.Y.
MIDWEST: Raytone Screen Corp., 401 West St. Charles Rd., Lombard, Ill.

Ed Seeley is named chief engineer for Altec Lansing Corp.

864 Theatres in N. Y. Area

Theatres situated in the New York City metropolitan territory total 864, including 821 conventional houses and 43 drive-ins, according to a recent count. The metropolitan territory includes New York City, Long Island, New York State south of Kingston, and New Jersey north of Trenton.

New York City's five boroughs have 436 theatres and two drive-ins. Location of the theatres can be broken down as follows: Manhattan, 160; Brooklyn, 146; Bronx, 68; Queens, 79, and Staten Island, 10.

Theatres in Long Island, outside of Queens total 72, plus eight drive-ins, while there are 93 theatres and 14 drive-ins in the southern part of New York State. Northern New Jersey has 220 theatres and 19 drive-ins.

Hi-Fi Show in New York

The largest assembly of high-fidelity enthusiasts ever to gather for a single event are expected to attend the 1955 Audio Fair, to be held for four days beginning October 14 at the Hotel New Yorker, New York City. A development of the last few years, the Fair is of interest to music lovers, hi-fi hobbyists and professional audio engineers. Interest in high-quality sound reproduction in the home has zoomed.

Britain Box-Office Down

A decline of more than $1 million in gross box office receipts in Great Britain for the first quarter this year compared with a similar period in 1954, was reflected in the latest returns. A mark of $76,272,000 was recorded for gross takings, contrasted with $77,726,000 in 1954.

Ed Seeley to Hollywood

ED SEELEY, chief engineer of Altec Service Corp. at New York headquarters since 1946, has assumed his new duties as director of engineering for the parent outfit, Altec Lansing Corp. in Beverly Hills, Calif.

Seeley, widely regarded as an outstanding electronic engineer in the aural-visual field, began his career as a field serviceman with the old ERPI company in 1929. When Altec was formed in 1937 he was named development engineer. During World War II, at the request of the National Defense Research Council he was assigned to several important projects at Bell Telephone Labs.

Major Industry Credits

A graduate of Cornell University engineering school, Seeley is credited with major contributions to the solution of problems attendant upon the recording and reproduction of magnetic sound. He is secretary of the Society of Motion Picture & Television Engineers.

Ed is remembered fondly as a fine engineer and an all-around good fellow by the hundreds of projectionists who were fortunate enough to enjoy direct contact with him.

Republic Pictures Profits Rise

Republic Pictures reports a net profit of $804,202 for the fiscal year ended October 31 last, compared with a net of $497,217 for the previous year. Republic is increasing substantially its Tv film activities, with arrangements to release Gene Autry and Roy Rogers pictures to Tv concluded.

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On The Right Flank, On The Left Flank—and Surrounded

For all who read as they run, we direct attention to the appended pronouncement by Barney Balaban, president of Paramount Pictures Corp. We hope that those who read these lines will recall that Mr. Balaban's present eminent position in the motion picture industry was attained via the exhibition field—that is, the operation of a multiplicity of theatres which employed doormen, cashiers, ushers, cleaning women, stagehands, and projectionists—wage-earners all.

Mr. Balaban in his official capacity is still actively engaged in the pursuit of the theatre exhibitor dollar by reason of the distribution of Paramount Pictures at rental rates which might occasion astonishment in a more well-ordered industry.

Here are excerpts from Mr. Balaban's effusion:

"The pious declarations of David Sarnoff, chairman of the Board of National Broadcasting Co., who attacked 'Pay-As-You-See' television and the interest of motion picture companies in Toll-Tv is absurd. He attempted to defend the vested interest of the big networks in maintaining the present system of so-called 'free Tv' . . . There is less freedom in the Tv market-place because of its present dominance by the giant networks than in any form of entertainment distribution. . . .

"It is a few executives of the networks and a handful of sponsors (can you hold 350 sponsors in one hand?) who determine what the public shall see . . . It's the sale of merchandise rather than the inherent value of the program that sets present Tv standards.

"One gets tired of these pious declarations about the motion picture companies in their relation to television . . . Anyone can make a motion picture who has the talent and money to do so. There is nothing to prevent NBC from investing in quality production motion pictures as we do in our business.

"Why doesn't Mr. Sarnoff lead the parade? The answer is simple: sponsors cannot afford to pay for a million-dollar production and then *give* it away."

We leave it to the judgment of the thousands of projectionists and stagehands who have labored assiduously through the years to make it possible for Mr. Balaban to rise to the presidency of Paramount Pictures Corp. to render their own judgment upon the foregoing.

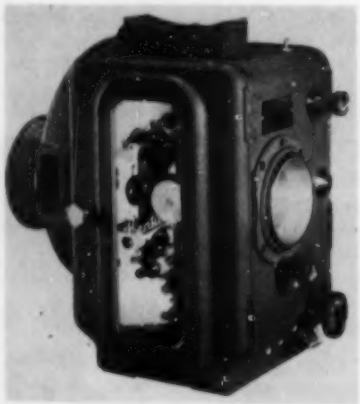
Century C and CC Heads in Improved Versions

CENTURY PROJECTOR CORP. announces that an improved version of the well-known Models C and CC projector mechanisms are now being manufactured in quantity and are available for shipment throughout the world.

Among the improvements are an enlarged observation window for easier viewing of the film as it passes through the projector, a new design of water-cooled aperture (non-condensing) that can be easily changed to accommodate all standard and special film sizes, whether VistaVision, CinemaScope, Superscope, etc., and newly designed light shields to accommodate the latest high-light-output arclamps.

The mechanism can use 4-inch diameter high-speed lenses and, with adapters, can be used for all standard lenses including those for C'Scope. The lens mount now makes it possible for the projectionists to easily focus the more critical short-focus, high-speed lenses. Also incorporated is a newly developed lubricant which will not "creep" or change viscosity within a temperature range from freezing to boiling, insuring uniform focusing at all times and under all conditions.

The main drive shaft is designed so that the soundhead coupling is directly mounted to the shaft, eliminating the usual 17-tooth pinion and stud unit, resulting in a positive trouble-free drive arrangement between mechanism and soundhead.



Exterior view of Century Models C and CC projector mechanisms.

Simplex Drive-in Speaker Highly Shock-Resistant

The new Simplex drive-in speaker, now being marketed by National Theatre Supply, contains a number of design refinememnts to make it more resistant to rought treatment and easier for the theatre patron to use.

The unit includes a 4-inch Alnico-V aluminumm voice coil speaker, springmomunted into the two halves of the die-cast aluminum housing. This mounting method assures a floating suspension which reduces shock, minimizes magnet shifting and simplifies replacement.

The housing is finished in a durable silver hammertone enamel baked over a zinc chromate base, and has a two-step window bracket to aid in positioning. The handle is an oval-shaped plastic tube, providing space inside for a phorescent theatre name or slogan card which glows in the dark. The speaker is said to be weatherproof, and contains tamper-proof Phillips head screws throughout.

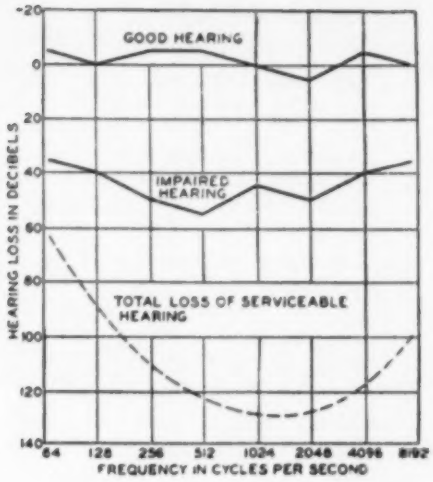
Ampex Stereo Sound

A new stereophonic theatre sound system designed to "make show failure almost impossible" has been developed by the Ampex Corp., Redwood City, Calif. The system, known as the Master Series, is priced at $3,995 for the complete package. Distribution is through the Circuit Construction Corp., and all installations are handled by the Altec Service Corp.

Some 200 Ampex sound installations are now in theatres throughout the country, according to Harrison Johnston, Ampex sales manager. These are in the 30, 60, 80 or 100 watt classifications. The new Master Series, in the 30 watt class, follows the higher priced De Luxe series and Super series.

Primarily a three-channel system, the Master series may be changed to four channels by using the theatre's existing optical system.

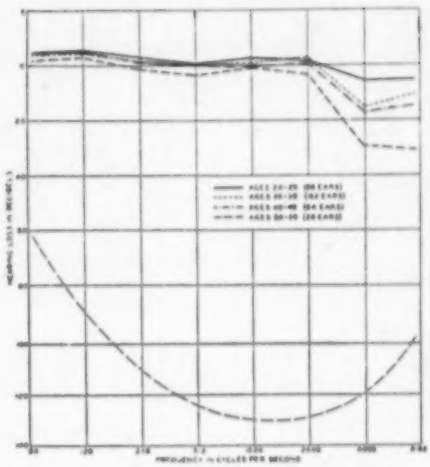
The new 30 watt series equipment includes two penthouse magnetic reproducers, each equipped with four channels in the head, thre for sound and one for the signal.



Graphical representation of the difference between normal and hard-of-hearing ears.

Just in Case Somebody Ups and Asks You

As everybody with a modicum of technical knowledge knows, increasing age in a human has the effect of gradually decreasing his aural and visual perception. Still, we are assailed on all sides by the shrill cry (thank God for old age) that this, that and the other system of production and reproduction will carry us beyond our physical limitations and visit upon us the pure joy of "natural" auditory sensation. Take a look at the accompanying graphs and decide for yourself.



Investigation showed that with advancing age little impairment of hearing normally takes place except at the higher frequencies.

Todd-AO Bows in N. Y. Oct. 1?

Chalk up still another postponement for "Oklahoma!", first of the Todd-AO so-called spectaculars. October 1 next is now the *tentative* date for the premiere at New York's Rivoli Theatre which, it is said, will feature a new development in a screen 65 feet wide by 25 feet high and with a curved depth of 13 feet, approximating Cinerama dimensions.

With the cost of remodeling the Rivoli — loge seats removed and well covered over — estimated at $300,000, it appears that these new processes are good for the construction trades, if not for the movie exhibition field.

AB-PT Projected Earnings

American Broadcasting - Paramount Theaters expects to earn about $2 per common share in 1955, with Tv operations contributing a fourth of this. The nature of Tv operations, with a relatively high proportion of fixed charges, is such that after the break-even point, a large proportion of additional revenue is carried through to net. AB-PT reached the break-even point last year, with Tv earnings in the first half of this year at 77 cents per share, as against 37 cents last year.

Technicolor Group Insurance

Dividends amounting to more than 10 weeks' premiums were received by employes participating in Technicolor Corp.'s group insurance plan. The Metropolitan Life Insurance Co. paid this dividend despite the fact that $201,237 have been paid out in benefits over the year ending May 2. Amount will be divided between company and employes in same ratio as they share premium payments.

Chicago Amusement Tax Up

Chicago's 3% amusement tax collections totalled $940,771 in the first half of this year. This includes $577,206 derived from theaters. In the first six months of last year collections were $912,169, with $573,314 coming from theaters.

Closed-Circuit N.D. Games

Three Notre Dame football games will be televised to Sheraton Hotel ballrooms in 12 cities via a closed-circuit this Fall. Admission will be $4 for the video games between Miami, Navy and Iowa. Sheraton will not share in the returns, the $4 tab going toward the cost of producing the telecasts.

RKO Theaters' First Half Net

Net income of RKO Theaters for the 26 weeks ended July 2 was $599,757 compared with $904,025 last year. Net income in the second quarter of 1955 was $269,521 before deduction of special non-recurring loss items, which reduced net income to $64,521 as compared with $418,666 in the second 1954 quarter when there were no special recurring loss items.

New Jersey Clearance Howl

The Allied Theater Owners of New Jersey are seeking quick action on clearance of pictures playing in New York. The urgency stems from the fact that subsequent runs in northern New Jersey have to wait as long as five months after the opening of a picture in New York before they can get a crack at it.

This yowling has persisted for many years, all to no avail.

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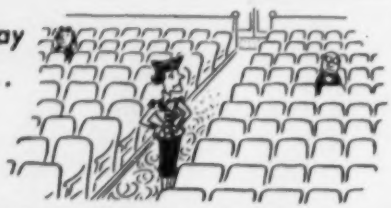

BUT
EVERY PERFORMANCE
STILL
MUST BE PERFECT!

A perfect performance calls for equipment that rolls in top shape from earliest matinee to midnight show. The best man to keep it that way is an expert RCA Theatre Service Engineer. And he's the *only* man who's backed by all the broad technical resources of RCA.

RCA SERVICE COMPANY, INC.
A Radio Corporation of America Subsidiary
Camden, N. J.

Modern Science Notes

An Army development is a radiation detector, about as big as a king-size cigaret package, which can be produced cheaply for soldiers and civilians. The device can measure accurately the amount of radiation an individual has absorbed in the wake of a nuclear explosion. This latest atomic age defense device is called a "tactical radiation dosimeter."

• • •

Accurate measurements of audio-frequency current and voltage can be made easily and rapidly with two newly-devised instruments, says the National Bureau of Standards. One, a volt-ampere converter, provides 0.5% accuracy for laboratory use with a D.C. potentiometer. The second, a thermocouple volt-ammeter, is a portable, direct-reading device with an accuracy of one-half of 1%.

• • •

Electric sleuth that detects and counts germs, dust, and other airborne particles too tiny to see has been developed by Armour Research Foundation under sponsorship of the Army Chemical Corps. An elaborate instrument, the aerosoloscope can measure particles as small as 40-millionths of an inch long, and is 1,000 times faster than the usual microscopic examination. The Army announcement suggested potential uses in public health work and industry to trace sources of smog and other air pollution.

The Washington, D. C., district office of Ampex Corp., has moved to 8033 13th St., Silver Spring, Maryland. The company manufactures magnetic tape recorders.

• • •

The Society of Motion Picture and Television Engineers recorded 600 new memberships during the first half of this year.

DAMAGE TO PRINTS

(Continued from page 16)

speed motors, this test cannot be conducted by most projectionists.

Specifically, overall gate tension should range between 6 and 18 ounces for the average projector and with the tension equalized on both margins of the film. "Green" prints run best, and with minimum damage to the perforations if sticking occurs, at 6 or 8 ounces. Average prints require average gate tension, that is, about 12 ounces. Old, well-seasoned prints may need as much as 16 or 18 ounces for steady projection.

Testing Gate Tension

Gate tension may be tested by means of a short length of clean film and a small tubular spring scale having a hook to which the weight (in this case the strip of film) is attached. A hole is punched near the top end of the film so that the strip may be pulled up through the closed gate by means of the scale. The reading of the scale as the film is being pulled upward indicates the tension.

It is very difficult to make radical changes in the gate tension of the older projectors, as the leaf-type springs have to be bent with the fingers. Many of the more modern projectors, however, are provided with tension adjustments which permit the projectionist to change the gate tension even while a picure is being shown.

Even a cursory examination of the sprocket holes of old, wornout theatre-release prints shows that gate tension is set much too high in the average theatre projector Too much tension results in characteristic cracks at the corners of the perforations. Excessive gate tension also increases the rate of

Billion for Broadcasters

The broadcasting industry will achieve its first billion-dollar gross-income year in 1955, according to an announcement by the National Association of Radio and Television Broadcasters. Tv is expected to gross over $600,000,000, with radio running very close to it.

for VistaVision

Lorraine ORLUX SUPER-CHARGED LARGE-CORED Carbons

For DRIVE-INS & THEATRES with HUGE, WIDE-AREA SCREENS • CARBONS Inc. BOONTON, N.J.

for CinemaScope

wear of the intermittent-sprocket teeth; and hooked teeth, in turn, chip and tear the pull-down edges of the perforations.

It is essential that the tension *be the same at both sides of the gate.* The pads which hold the film at the aperture should have somewhat greater pressure than the higher set of pads.

Adjusting the Guide Roller

Incorrect lateral adjustment of the flanged guide roller at the top of the gate may indirectly damage the film perforations. The purpose of this roller is to edge-guide the film as it passes down into the gate. A change in the position of the guide roller produces a corresponding lateral shift of the film in the gate and on the face of the intermittent sprocket.

The sprocket teeth, however, limit the amount of lateral shift possible on the sprocket. If the guide roller is shifted too far to one side therefore, the sides of the perforations bring up against the ends of the sprocket teeth, and the film assumes a slightly *slant-wise* course in the film gate. The result is that the sprocket teeth engage the perforations on only *one* side of the film. Excessive wear of the perforations on this side of the film ensues, and if this undesirable condition is not corrected, the teeth on one flange of the sprocket wear more than those on the other flange.

The flanged guide roller must revolve freely. If the film fails to turn it, the shaft and pivots may be clogged with dirt, the pivots may be too tight, or the tension of the coil spring too great. The tension of this spring is critical.

Guide Roller Flanges

If the movable (inner) flange presses against the edge of the film too strongly, the film will tend to crimp as it enters the gate, with resulting sidewise unsteadiness of the projected picture. Only very little tension is needed for proper film-guiding. A spring that pushes the flange against the film too tightly may be weakened by cutting off and discarding a few turns from the coil.

The flanges of guide rollers which fail to revolve become grooved by the film. Grooved flanges roughen the edges of the film and tend to tear the corners of splices. Weak splices may come apart when they encounter a defective guide roller.

Valuable footage may be destroyed if a film break occurs anywhere in the projector or soundhead. Film may wind up on a sprocket or pile up in the machine. Breaks in the older types of soundhead often result in "pleating," a folding up of the film in the manner of an accordion bellows.

All multilated footage should be removed from the machine and thrown away. If a great deal of film has been lost, the exchange would appreciate being advised of the reel number and footage numbers printed in the perforation margin of the damaged film. It is also a good idea to explain the circumstances of the film break.

Film breaks, we repeat, are avoided by adequate film inspection and painstaking projector maintenance.

Reel-End Alarm Riders

Last but not least the projectionist must consider his reel-end alarm riders as possible causes of scratched film. This type of signalling device usually employs a small roller which rides on the emulsion side of the reel of film in the upper magazine. If the roller does not turn freely, or if it has become burred or damaged, it may inflict a series of lengthwise scratches on the picture area of the film.

It is only fair to state, however, that an examination of the reel-end alarm devices in a large number of theatres indicates that they seldom cause any injury to prints.

[END OF SERIES]

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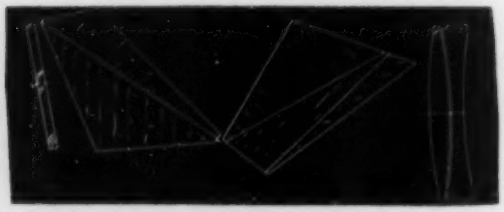

FIGURE 7

Arrangement of prismatic projection attachment.

ANAMORPHOTIC SYSTEMS

(Continued from page 12)

ment. The complete arrangement is shown in Fig. 7.

Some variable prismatic attachments being made in other parts of the world do not include supplementary focusing lenses. The errors of focusing which result are only dependent on the ratio of the two focal lengths and, thus, the expansion ratio. The actual form adopted for the prismatic components can have no influence on this effect.

Requisites for Focusing

To illustrate the necessity of providing suitable focusing means, an image was projected through a variable attachment correctly focused for a given screen distance. The equal definition on vertical and horizontal lines was noted, and it was also observed that *both* horizontal and vertical lines went in and out of focus simultaneously.

Then an image was projected through an identical system whose supplementary focusing arrangement had been removed. It was seen to be impossible to achieve *simultaneous* focus for vertical and horizontal lines, and that the errors increased with *increased expansion ratio.*

The demonstration clearly proved that while the focusing arrangement does add to the cost of the equipment and results in greater weight and slightly increased absorption of light, it is necessary if an adequate standard of definition is to be obtained.

In view of certain misconceptions which have arisen in the industry, it is important to stress that a variable anamorphotic lens should only be used to restore the *particular compression* incorporated in the release print being projected. A change in aspect ratio of the screen picture can only be obtained by masking in the gate aperture of the projector. The size of an object appearing on the screen is governed solely by the focal length of the projection lens selected. Only *one* expansion ratio restores the geometry of picture detail, and an acceptable picture cannot be obtained when the aspect ratio of the picture is altered *solely* by means of the anamorphotic expansion ratio.

It was stated previously that anamorphotic projection permitted the use of larger projector gate apertures and resulted in improved definition and illumination. The improvement in definition exists at *all* expansion ratios, but the gain in screen illumination is most apparent at large expansion ratios such as the factor 2 used for CinemaScope.

Light-absorption Losses

In comparing the illumination on the same screen area provided—first, by normal projection from a cropped gate, and second, anamorphotic projection from a maximum area gate—allowance has to be made for the extra light losses by absorption and reflection within the attachment. It is useful to know where the illumination provided by the two methods is equal.

Assuming that the maximum gate width is constant, the amount of light passing through the gate will be proportional to its height and thus inversely proportional to its ratio.

If the gate for anamorphotic projection has maximum height, its aspect ratio will be about 1.25 to 1. Prismatic attachments transmit about 7/10ths of the available light, so that the two methods give equal illumination at screen aspect ratios of 1.25 divided by 0.7, or about 1.8 to 1. Above this ratio anamorphotic projection gives brighter screens.

B & K Profits Rise

Earnings of the Balaban & Katz theatre chain (Chicago) increased to $1,204,065 for the year 1954, compared with $832,892 in the previous year. The circuit has plans for expansion, including the building of drive-in theatres, once it has satisfied the requirements of the Federal Court divestiture decision, which requires B & K to sell five more theatres.

Tiny storage batteries, less than one-half cubic inch in size, that produce electricity from the rays of atomic bomb by-products, are being tested by the Army and Air Force. Researchers predicted the batteries may be especially useful in electronic equipment using transistors. Core of the battery was said to be strontium 90, a metallic element which, when purified by a chemical process, has a high degree of capacitance similar to calcium but harder.

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100 YEARS AGO, during a frontier skirmish, an Indian brave, singing his own death song, charged down on a young officer.

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It was not Crook's first Indian, nor his last. (His right leg already contained a flint arrowhead he was to carry to his grave.) And by the time he made general, Crook was the greatest Indian-fighter this country has ever had.

Yet, he was also one of the best friends the Indians have ever had. For he understood them well, dealt fairly and firmly, and always kept his promises.

When Crook died, Indians wept. And a Sioux chief named Red Cloud said: "He never lied to us. His words gave the people hope."

No nation can ever have enough men like George Crook. But America had, and still has, a lot of them. That's important to remember. Because it is a wealth of human character rather than a wealth of money that gives America its real worth. Just as it is the Americans, all 160 million of them, standing behind our country's Savings Bonds, who make these Bonds one of the world's finest investments.

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